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Somewhere West of Chicago

EARLY morning and the limited nearing its destination. Familiar landmarks flash past. The engineer looks across the cab at the fireman and grins. The fireman returns the grin, then expertly scans the water gauge. On time! Yes, and time to spare! Another hour—then rest!

Back in the Pullmans the passengers awake to the new day—alert, happy—invigorated by a full night of refreshing, undisturbed sleep—fit and ready for whatever the day may bring forth.

Men whistle gaily and chat inconsequentially in the wash room as they cheerfully wait their turn to shave. Women find a new interest in each other's society.

In the dining car the low hum of conversation and subdued laughter mingle with the merry clatter of dishes and the jingle of silverware as eager appetites are satisfied in pleasant convenience.

And everywhere, from one end of the train to the other, smiling faces, shining eyes, brisk movements, good-humored tolerance tell the tale of another railroad journey speedily, safely and comfortably accomplished on Timken Tapered Roller Bearings.

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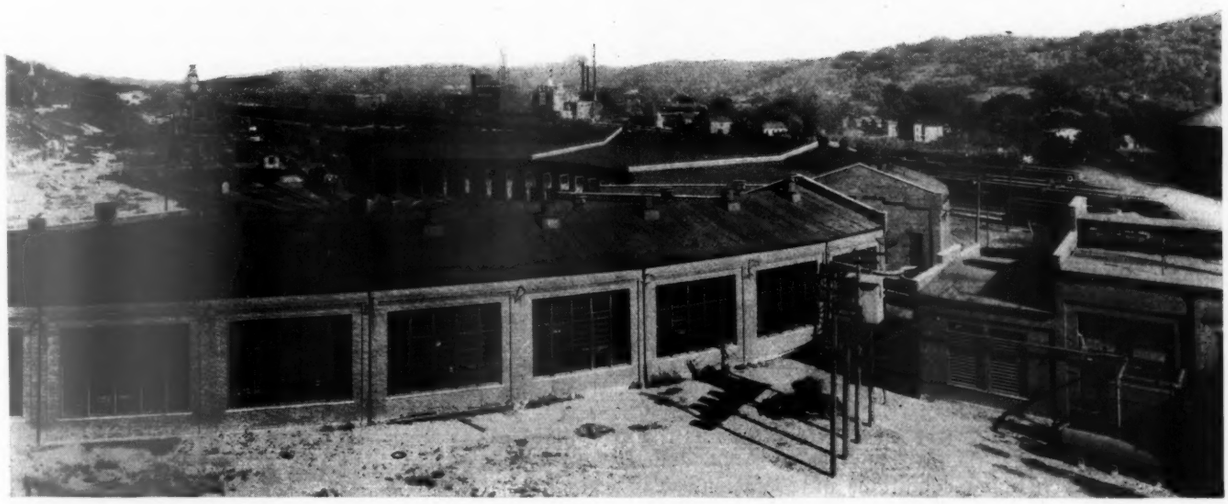


A smokeless engine terminal

Modern Facilities—Their Effect On Engine Terminal Operation

Changed operating conditions emphasize value of modern methods—Locomotives now spend less time at terminals and more on the road

THE A.R.A. Mechanical Division Committee on Shops and Engine Terminals introduced its report at the 1928 meeting by the opinion "that the maximum utilization of modern power cannot be obtained unless the engine terminal and facilities in connection therewith are designed for the rapid handling of locomotives. It must not be expected that antiquated terminals will do this. Also, the acceleration of trains over the road by improvements in grade and roadbed, double tracking, signals, despatching and other improvements in operation may be in a large measure offset by delays to motive power at inadequate terminals." The real necessity of modern facilities is clearly set forth in that statement and the experience of those roads that have directed the attention of mechanical designers to providing up-to-date engine terminals has demonstrated the wisdom of the effort.

To attempt to prove by any general figures just what the effect of modern facilities has been on engine terminal operation would be a very difficult task but it is possible to show in many individual cases the actual saving in time and labor that has been effected in certain operations. This article, written from data compiled within the past six weeks as a result of direct ob-

Changing a throttle box with an electric crane truck

servation at several modern engine terminals, will attempt to record specific examples of the results of using modern terminal facilities.

The Changing Trend

Ten years ago there were approximately 3,300 engine houses in the United States, ranging all the way from the one-stall house, turning one or two engines a day, to the large terminal despatching 100 or more locomotives each 24 hours. Today there are considerably less than 3,000 engine houses, the rest having been abandoned as a result of changing conditions of operation. Ten years ago the engine terminal, at least as far as facilities were concerned, was looked upon as a sort of necessary evil and, due to this attitude, it fell heir to those tools and equipment that had ceased to be of maximum serviceability in the back shop. The modern boiler-washing plant had then not been developed to its present efficient state; direct steaming was unknown; hydraulic or pneumatic drop pit jacks were many times a source of danger and annoyance rather than a valuable facility and the problem of handling material in the house was purely a problem of a foreman being able to get enough men and hand trucks. Changing an air pump was an all-day or all-night task that even ambitious mechanics approached with no great amount of enthusiasm. Ten years have wrought great changes in the enginehouse until now, to quote one mechanical officer, "the roundhouse is regarded as a really desirable place in which to work."

The fact is that radical changes in operating methods, such as longer engine runs, have forced the mechanical department to give greater attention to engine-terminal facilities. The small inefficient terminals have in many cases been abandoned or modernized and many larger terminals—comparatively modern ones—at intermediate points have been closed up because the newer despatching methods are running all the power through those points. This has placed a greater burden on the remaining terminals with the result that they would have been entirely inadequate to meet the demands of the past five years had not modern facilities come to the rescue and provided means for performing many operations in a fraction of the time formerly required. The attitude of mechanical officers today, therefore, is to accord the engine-terminal facilities the careful consideration that their importance warrants.

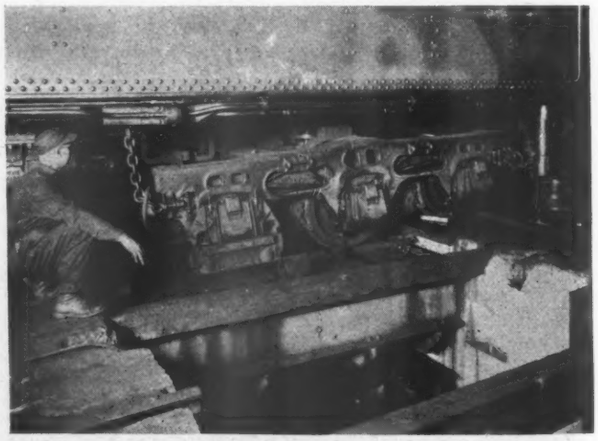
The function of any engine terminal is to return motive power to revenue service in the shortest possible time. The minimum time required to effect a despatchment would be in the case of a locomotive doubling out of the terminal without entering the enginehouse. The time-consuming factors of enginehouse operation are the boiler washing, running repairs, firing up and testing. It is in the performance of these operations that modern enginehouse facilities have had their greatest influence. The modern locomotive spends more time on the road and less time in the enginehouse than did its predecessor of 10 years ago with the result that the ratio of locomotives assigned to locomotives despatched has decreased and locomotive miles per day have materially increased. Modern facilities have made the enginehouse a better place to work in and have made it possible to effect an increase in the number of despatchments without corresponding increases in the labor force.

Modern Enginehouse Facilities

Exclusive of many important factors relating to the design of buildings, the development over the period of the past 10 years has related principally to the introduction of the direct steaming system, electric crane trucks and the modern electric drop table. Other important facilities which have been vastly improved are water treating plants, boiler-washing equipment, turntables and coal and ash handling equipment.

Not all engine terminals are faced with the necessity of considering the installation of a water treating plant. One road reports that the difference between complete water treatment and partial water treatment means the difference between washing boilers every 30 days instead of every six days. Therefore, where poor water conditions are a factor in operation water treating facilities have an extremely important bearing on the terminal maintenance problem.

Important progress has been made in enginehouse and yard lighting equipment with the result that night work has been made safer and more efficient. Within two years radical changes have been made in the type of equipment used in enginehouse lighting as well as in the intensity of the illumination. Quite recently several enginehouses have been illuminated with a new type of lighting equipment wherein the lighting is actually directed upon the work being performed, thereby giving a



Inserting liners in a tender-truck center plate is quickly done on a modern drop table

much higher intensity of illumination on the working plane. Some idea of the increase in intensity of illumination may be gained from the fact that five years ago the average enginehouse was lighted with about 400 watts per stall whereas today this has increased to 2,000 watts or more per stall.

Direct Steaming

During the year 1927 a large mid-western railroad installed direct steaming and other modern facilities at one of its newer terminals. The improvements were made to expedite handling the heavy power recently purchased by the railroad and to eliminate smoke, as the terminal is located well inside the limits of a large city.

While economy was not the prime consideration of the management, the savings effected have well justified the capital expenditure, and the improved operating conditions have been a great relief during the periods of peak business that have prevailed in the past three years.

Prior to the direct steaming installation the 23-stall enginehouse was heated by an indirect heating system, the outlets from the heaters being piped to each stall. The upkeep of the air ducts was considerable due to the corrosive action of gases. The whole heating system would have had to be renewed and as a result of tests made in other enginehouses with direct steaming it was decided to eliminate the heating system entirely. During extremely cold weather it was found that while there was sufficient heat in the enginehouse, it was necessary to install to direct steam radiators to eliminate the stray steam caused by locomotives moving out of the house and by the testing of air pumps and turbo-generators. Even during sub-zero weather the enginehouse has been comfortable with the radiation from locomotive boilers under direct steaming. The three-year test has proved conclusively that heating systems are not required with direct steaming installations unless the terminal is located where temperatures below zero are frequent.

A careful check shows that no men were laying off during the last three winters due to colds and the common grippe which seem to accompany enginehouse work. During last winter's storm when all terminals were strained to the limit, engines were despatched without delay, the trainmaster remarking that engines were coming out of the enginehouse as though it were summertime.

The shop equipment of the modern terminal is housed in a clean, well-lighted shop

The boiler room of a modern engine terminal

The attitude of the employees has changed entirely since the installation, the men being able to wear cleaner clothing, and the absence of gases and smoke has created a different atmosphere which has resulted in greater efficiency and improved work.

By testing headlight generators, air pumps, feedwater pumps and injectors, at the convenience of the specialists the peaks in enginehouse despatching have been smoothed out and it is no longer necessary for the various workmen of different crafts to concentrate on one engine for tests when it is marked up for despatching. While previously much testing was done outside the enginehouse due to the fact that steam was seldom raised until the engine was due out, outside testing has now been entirely eliminated.

No one can accurately estimate the saving to boiler side sheets and flues due to carrying an almost fixed temperature on boilers. The boiler foreman at this point states that the running repair work has been cut in half. The question has been frequently asked if there was not extra time by boiler makers due to a locomotive carrying steam all the time and boiler men working in hot engines. The answer is that there is not as much work to do and that the men accustom themselves quickly to the changed conditions and are able to perform any work as quickly as on a cold engine.

Smoke inside the enginehouse has been definitely eliminated. Experience over three years has proved that engines coming from the enginehouse with 150 lb. of steam or over can be fired up without smoke. The present firing system consists of a vacuum torch using 15 lb. oil pressure and around 60 lb. air pressure. The torch is used to ignite the coal directly and it is important that free oil be not allowed to run on the coal. It requires no expert help for lighting as the average roundhouse fireup man can be taught the process in a day. It is important that the firing-up process be not rushed. An engine can be fired in 10 minutes without smoke, while the same engine fired in five minutes will make an objectionable smoke. It is surprising how low-rate help will take pride in the firing without smoke and that, of course, is the secret of success.

The preliminary laying of the fuel bed in the engine-

house to cover the grates is far more important than at first supposed. While an eight-inch bed of fuel was first used, it has been found that a better fire is secured with a thinner layer evenly distributed, four inches being sufficient. This allows the regular fireman to shape his fire to his individual liking and makes for a better road condition.

Table I gives the comparative costs of enginehouse operation for two periods three years apart—one before the direct steaming equipment was installed and the other after it had been in service almost three years.

The Washout System

With the direct-steaming installation a hot-water washing out system was installed with a high-pressure pump. This resulted in speeding up the washout gang until the same crew washed three engines a day instead of two.

1 Boiler washer at 60 cents an hr., 8 hrs. daily	$4.80
1 Boiler-washer helper at 57 cents an hr., 8 hrs. daily	4.56
	$9.36
Previous cost of washing engines, each	$4.68
Present cost of washing engines, each	3.12
Saving	$1.56

The hot water used is reclaimed from the blowoff and there is no additional cost of operation of the pumps.

Electric Drop Tables

One of the most important labor saving facilities that has been developed for enginehouse work within the past 10 years has been the modern electric drop table. This device has simplified the performance of many ordinarily difficult jobs which are necessary in the maintenance of the running gear of a locomotive or tender.

In Table II will be found examples of typical jobs that are performed with the assistance of an electric drop table. The information given was secured at a modern engine terminal on the main line of a road despatching at the present time an average of 135 locomotives each 24 hours. At a terminal such as this, time, in turning locomotives, is an extremely important factor. These examples, therefore, are of unusual interest.

Other Examples

An example of what can be done in an emergency with a modern electric drop table is the recent case at a large terminal where an engine was marked up for service and on the ready track, the crew being on preparatory time. It so happened that a Federal inspector was inspecting power at that particular terminal and discovered a broken leaf in the right No. 1 driving spring on this engine and called the attention of the general foreman to the defect. The engine was run in the house by the crew and placed over the drop pit. While this was being done the general foreman despatched a machinist to get a new driving spring. By the time the machinist returned with the new spring, the engine had been spotted on the pit, the drop table run up and the spring rigging blocked.

The old spring was removed and replaced by the new spring. The blocking was taken out, the table run down and the engine taken out of the house by the crew ready for service. The actual time required to remove and replace the spring, from the time the blocking up of the spring rigging was completed to the time the engine was ready to leave the house was six minutes. The total time from the time the engine left the ready track for the engine house to the time it returned was entirely within the 30 minutes preparatory time allowed—the change of springs in this case occasioning no delay to the despatching of the engine.

The value of the modern drop table was found at another terminal serving a large classification yard where a hump-yard engine was marked up for service and on the ready track. A complaint was made by the engine crew that the tender was too low for the engine. The engine was backed into the house by the crew and run over the drop table. The tank was lifted by means of the drop table, and held up by handjacks. The table was then dropped with the tender truck sufficiently to permit truck center-pin liners to be inserted on the center bearing, thereby raising the tank to the desired height. The trucks were raised, the tank lowered by releasing the jacks and the engine was ready for service with the defect corrected. The total time required for correcting this defect was 15 minutes from the time the engine left the ready track for the house to the time it returned ready for service. In this case there was no delay in despatching the engine.

A special attachment on the crane boom simplifies the handling of rods

Another example which occurred at the same enginehouse involved the changing of two driving springs which had been found loose in the band and three driving-spring saddles which were found cracked. The engine was run over the drop table and the parts removed and replaced by one machinist and a helper in one hour.

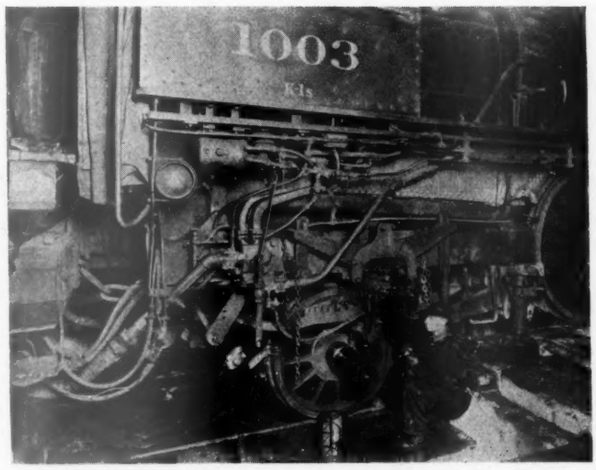
Electric Crane Trucks

The problem of handling parts and material in and around an enginehouse before the introduction of the electric crane truck was largely a problem of manual labor. Owing to the physical shape of an engine house the installation of overhead cranes has always presented difficulties. Continuous monorail hoists have been used to a certain extent and sometimes, in con-

junction with similar hoists operating alongside the locomotive, have facilitated the handling of materials and parts from the floor to the point of application on a locomotive.

It remained for the power operated crane truck to supply the demand for a material handling device flexible enough to operate in comparatively restricted spaces and not only bring materials from the storage areas or machine shops to the locomotive but actually to assist in applying them in difficult locations on the engine.

The variety of operations that can be performed with the truck crane and the time and cost savings effected



Lowering a trailer truck on a Whiting drop-pit table—The men are working on the table in safety

are amply suggested in the illustrations and by the comparative figures that are given in Table III.

Coal- and Ash-Handling Equipment

The increasing value of land in the vicinity of many terminals and the excessive maintenance costs on some of the older types of coaling stations have been instrumental in the development of modern mechanical coaling equipment. Uninterrupted service is one of the prime requisites of the coaling plant, which should be of such capacity as to provide a 48-hr. supply in advance at any time. The modern plant permits of easy unloading of supply cars with a relatively small labor

Table I—The Influence of Direct Steaming

DIRECT STEAMING—MONTH OF APRIL, 1930

	Monthly cost operation	Total investment
Total cost of installation, which includes new boilers, stokers, coal elevator, ash ejector, remodeling power-house building, foundation for boilers, new boiler feed, washout and fill-up pumps, new city water pumps and complete installation of direct steaming piping and facilities for oil firing locomotives outside the engine-house, retiring facilities the value of which was $55,000		$86,471.18
Interest and depreciation 10 per cent of $86,471.18—$8,647.00 yearly or $720.00 monthly	$720.00	
Cost of stationary plant slack coal—683 tons at $2.70 per ton	1,844.10	
Steam for air compressor, Steam for heating office, Steam for store building, Steam for freight sheds	11 per cent or $202.85	
Labor—		
3 engineers at 63¾ cents per hour	459.00	
3 firemen at 52¼ cents per hour	376.20	
1 plant engineer at $225.00 monthly, split 33⅓ per cent plant, 33⅓ per cent pumps, 33⅓ per cent piping	225.00	
Repairs—		
Labor—all repair work done by plant engineer. Material and supplies for power plant and direct steam piping	60.00	
Oil for lighting up engines—640 gal. at 3¼ cents per gal.	20.80	
Electric current	185.00	
	$3,890.10	

Engines despatched—1273
Cost per engine—$3.05

OLD PLANT—MONTH OF APRIL, 1927

The old plant consisted of two 150-hp. boilers, hand-fired and no ash-handling facilities. Coal was dumped into the boiler room from a ramp. Pump equipment consisted of washout, fill-up and two cold-water pumps and electrically driven 250-cu.-ft. compressor used for air. The engine-house was heated by an indirect heating system and a fan driven by a 52-hp. motor. A smoke duct connected to each pit with fans located in a fan room leading to a stack. Fans driven by two 52-hp. motors.

Power plant		$35,000.00
Heating system		8,716.00
Smoke duct		12,263.37
		$55,979.37
Interest and depreciation on $55,979.37 at 10 per cent—$5,597.00 yearly, or $466.00 monthly	$466.00	
Coal for stationary plant—455 tons mine run at $3.35 per ton	1,524.25	
Coal for firing up engines—1000 lb. per engine despatched. 1446 engines despatched, less 200 which were switch engines and fires were not dumped, making 1246 using fireup coal—623 tons at $3.35 per ton	2,087.05	
Steam for heating enginehouse, Steam for heating office, Steam for heating store building	20 per cent of power plant coal $304.85	
Labor—		
3 engineers at 61¾ cents per hour	444.60	
3 firemen at 50¼ cents per hour	361.80	
1 laborer at 40 cents per hour	96.00	
Repairs—		
Labor and material	380.00	
Oil for firing up engines—1446 gal. at 5 cents per gal.	72.30	
Electric current for air compressor, heating-fan motor and two fan motors for ventilating ducts	443.42	
Total	$5,875.42	

Engines despatched—1446
Cost per engine—$4.06

Saving per engine despatched by use of direct steaming—$1.01
Saving per month in total operating costs—$1,985.32, or $23,823.84 per year, which represents a saving of 27.5 per cent on investment.

A coal- and sand-handling plant—Capacity, 1,000 tons of coal and 25 tons of sand

force as compared with that required to operate many of the older types of coal docks.

A modern cinder-handling plant can contribute materially to the efficient and economical despatching of power. While there are many types to choose from, the question of cinder storage, where sufficient land is available, is a most important factor to railroads that operate in northern climates where freezing weather is encountered. Wet cinders dumped into coal or cinder cars during freezing weather can only be unloaded at prohibitive cost, and this is usually accomplished by dumping the cinders at some point on the line where they will have to be moved again in the spring. By

providing storage space the unloading cost is saved and the cinders are available for the use of the track department in the spring months when they are most needed. Also the storage of extra sand has proved economical in many cases. Where ground storage of cinders and sand is practiced the ash pits are served by a transverse overhead traveling crane. This type of crane can be used as an emergency facility for coaling locomotives at larger terminals in case the coaling plant is temporarily out of commission and at the smaller terminals can be used both for coaling locomotives and for handling the ashes. The cost of operation of such a crane is said to be very low, maintenance is negligible and the availability for service unusually high.

Table II—Performance of Modern Drop Tables

DROPPING DRIVING WHEELS

Under the old method, using drop-pit jacks, it required the services of two machinists, two helpers and one crane operator for one hour each. The cost was	$3.24
The new method requires one machinist and one helper one hour. The cost is	1.39
Saving	$1.85

RENEWING TENDER-TRUCK WHEELS

The old method required four tank men two hours each using the old style drop-pit jacks and hand jacks under the tank. The cost was	$5.92
The new method takes two tank men 30 minutes to do the job at a cost of	0.74
Saving	$5.18

RENEWING ENGINE-TRUCK WHEELS

The old method required one machinist and two helpers 2½ hours at a cost of	$4.90
The new method takes one machinist and one helper one hour. The cost is	1.39
Saving	$3.51

RENEWING DRIVER SPRINGS

The old method took two machinists and two helpers three hours each to perform the work at a cost of	$8.34
With the new equipment one machinist and one helper can make the change in 15 min. at a cost of	0.34
Saving	$8.00

RAISING THE FRONT END OF A LOCOMOTIVE

Under the former system, using jacks alone, it required three hours for one machinist and a helper to do the work. The cost was	$5.17
With the new drop tables one machinist and his helper can do the same work in 10 min. at a cost of	0.23
Saving	$4.84

CHANGING TRAILER-TRUCK HUB LINERS

Formerly this was accomplished by the use of hand jacks in conjunction with the old drop-pit jacks. One machinist and a helper could do the work in four hours at a cost of	$5.56
The new equipment, with one machinist and a helper performs the work in 30 min. at a cost of	0.70
Saving	$4.86

Note—All work is on a day-work basis.

CHANGING A FRONT DRIVING TIRE ON AN EIGHT-WHEELED SWITCHER

The engine is run over the drop table and the table is lowered, leaving the front wheel suspended over the space left by the lowered table. The tire is heated with a portable tire heater and when sufficiently heated is driven off from the wheel center into the space between the guides and the wheel. (The front side rod has, of course, been taken down.) With the aid of an electric crane truck the tire is dropped into the pit and a new tire is raised, heated and applied to the wheel. In using this method it is necessary only to remove the front side rod from the front wheels. No other parts need be dismantled.

Under the old system of changing tires on this particular type of engine it was necessary to drop the pedestal binders, remove the wheels and boxes and then take off the tire. The new tire having been applied to the wheel the process was reversed. The old method required the services of a machinist and a helper for 10 hours while under the new system the same men can do the work in four hours at an actual saving of approximately $9.00.

Table III—Costs Reduced With Crane Trucks

TERMINAL A

By the installation of a portable electric crane at a cost of $5,500 the following savings in labor were made:

Air Pump Changed with Crane		Old Way without Crane	
2 men at 80 cents per hr. 1 man at 57 cents per hr. Time—30 minutes	$1.085	2 men at 80 cents per hr. 1 man at 57 cents per hr. Time—1 hr.	$2.17

Saving—$1.085 per pump changed—Average 5 yearly—Saving per year $5.425

Main Reservoir			
1 machinist at 80 cents per hr. 1 helper at 57 cents per hr. Time—20 minutes	45.6 cents	1 machinist at 80 cents per hr. 1 helper at 57 cents per hr. Time—1 hr.	$1.37

Saving—91.4 cents per reservoir changed—Average 60 yearly—Saving per year $54.84

Main Rod			
1 machinist at 80 cents per hr. 1 helper at 57 cents per hr. Time—20 minutes	45.6 cents	3 machinists at 80 cents per hr. 3 helpers at 57 cents per hr. Time—30 minutes	$2.055

Saving—$1.599 per main rod changed—Average 240 yearly—Saving per year $383.76

Door Rings			
1 boilermaker at 80 cents per hr. 1 helper at 57 cents per hr. Time—20 minutes	$1.37	1 boilermaker at 80 cents per hr. 1 helper at 57 cents per hr. Time—2 hr.	$2.74

Saving—$1.37 per door ring changed—Average 36 yearly—Saving per year $49.32

Smoke Stacks			
1 boiler maker at 80 cents per hr. 1 helper at 57 cents per hr. Time—20 minutes	45.6 cents	1 boilermaker at 80 cents per hr. 1 helper at 57 cents per hr.	$1.0275
Load and Unload Wheels from Car			
3 laborers at 42 cents per hr. Time—30 minutes	63 cents	6 laborers at 42 cents per hr. Time—1 hr.	$2.52

Saving—$1.89 per car—Average 12 cars yearly—Saving per year $22.68

Total saving per year on operations listed above—$519.45—or 9.5 per cent on the investment. The crane is operated by men doing the particular job for which it is being used.

TERMINAL B

Name of Operation	Cost before using crane truck	Present cost by using the crane truck
Air pump removed (8½ in. cross compound)	$1.68	$ .629
Air pump applied (8½ in. cross compound)	1.52	.472
Air pump removed (9½ in.)	1.31	.493
Air pump applied (9½ in.)	1.17	.42
Boiler smoke box front removed	2.62	1.47
Boiler smoke box front applied	3.00	2.01
Tank truck transom applied	.98	.378
Boiler smoke box front removed (feedwater heater)	1.29	.40
Boiler smoke box front applied (feedwater heater)	2.58	1.72
Boiler back head removed and delivered	1.29	.90
Tires brought in from outside and placed at side of engine	.245	.03
Tires taken outside after removing from engine	.245	.03
Tank wheel transferred from one track to another	.265	.09
Engine cab transferred from one shop to another	.43	.18
Main reservoir removed from lye vat	.48	.132
Main reservoir transferred	.36	.088
Main reservoir removed	.902	.63
Main reservoir applied	1.26	.63
Main piston applied	1.54	1.09
Removing steam dome cover, 16 studs	2.38	.824
Applying steam dome cover, 32 studs	4.76	1.648

Note—The above operations are based on the crane truck moving from its first stall to the locomotive which is to be worked on and after the operation is completed, time is figured on the truck returning to its stall. It also includes the moving of air pump which is removed from the engine to the pump bench, and the reverse of this operation in applying a pump. The average travel of the crane truck for round trip from its station and return is about 300 ft.

The comparative figures in Table IV will give some idea of the relative cost of handling cinders at a terminal despatching an average of 42 locomotives a day, with a relatively expensive type of cinder-pit installation.

There are several types of dry cinder pits and many conditions of terminal operation, which make it difficult to set forth a comparison which represents the possibilities under all conditions. The selection of the type which will be most economical and reliable is a matter for determination after a study of all the local conditions.

Other Important Facilities

The developments and improvements that have been dealt with in detail in this article are by no means to be considered the only facilities that have contributed in a large measure to the ability of the modern engine terminal to function efficiently and economically.

To a great extent other devices and equipment, such as three-point suspension turntables, and particularly electric welding and acetylene cutting equipment have contributed in a very substantial way to the ease and economy of performing running repair operations and locomotive handling at modern terminals.

Another device which has come into use in recent years in a number of enginehouses, where locomotives

(*Concluded on page 330*)

Modernizing A Car Repair Shop

An imaginary tale in which a general car foreman thinks a little beyond his immediate job and plays a part in saving the company money

By H. K. Allen

THE car shop at Ridge Point was no different than the usual layout one would expect to see at any large terminal where facilities must be maintained for the repair of locomotives and cars —a light car repair track provided to handle the bad-order cars shopped out and similar provision for the bad-order cars requiring heavy or rebuilding repairs. These were the conditions that Oliver Carson found there when he was appointed general car foreman of the Lakewood division.

Three car repair tracks had been set aside for repairs to light bad-order cars, having a capacity of 125 cars. Adjacent to these tracks was a single track having a capacity of 36 cars which was being used for repairs to light-heavy cars or better known as recondition repairs. These tracks were located in the open yard in close proximity to the classification or transportation yard. An abandoned enginehouse together with what remained of a one-time power plant building constituted the heavy repair or rebuilding car repair shop.

Exclusive of the operating forces assigned to the light-repair tracks, including light-heavy or reconditioning repairs and those employees distributed over the three shifts in the classification yard, a force of 200 men was provided for the rebuilding of all-steel and composite open top cars. From this force an allotment of 50 cars was expected each week but was seldom, if ever, met.

The car department on this road had for many years been headed by an old-school railroader who believed that some railroad mechanical department men were just unfortunate enough to have been born to work in the car department and, such being the case, had learned in earlier years to take what was left after the locomotive department got what it wanted.

Carson did not show the least sign of disappointment or discouragement when he viewed his new surround-

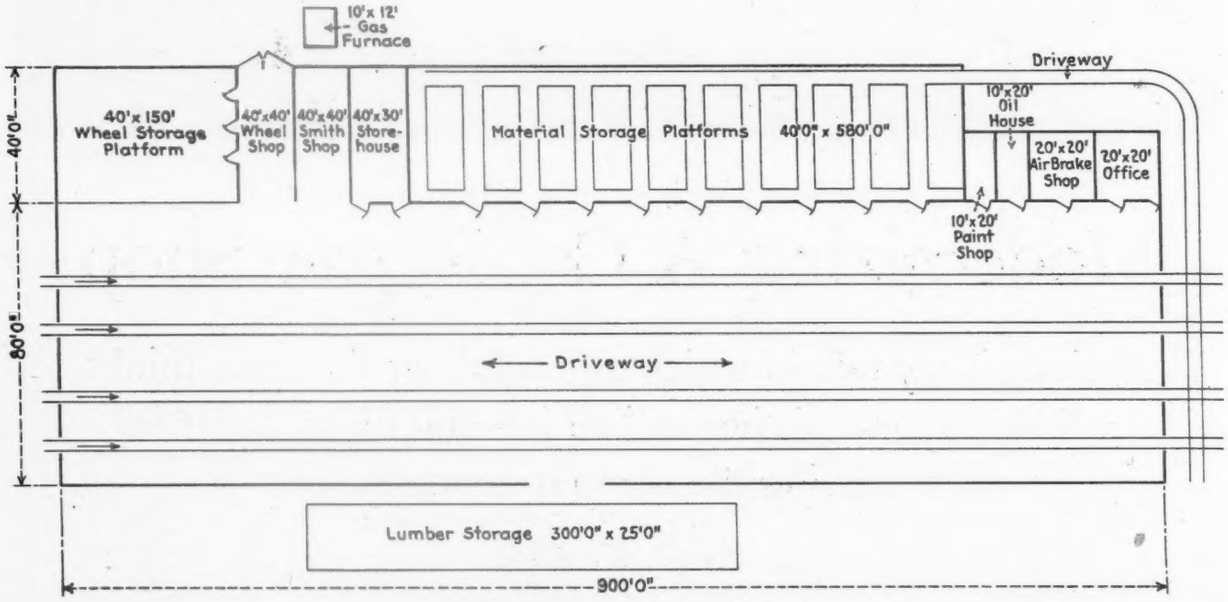
ings. It was some consolation to him to know that at least the surroundings were new for there certainly was nothing else in the car shops that could have been put in that class. He looked over the facilities with a growing sense of amusement bolstered up somewhat by a natural sense of humor for here was undoubtedly the greatest and most varied collection of ingenious machines all having one part in common—an air brake cylinder. Carson could not help but think to himself, "Little did George Westinghouse realize what he started in the car department."

A new modern locomotive shop and engine terminal had just been completed at Ridge Point and had been in operation for about 90 days. As a result the car department had fallen heir to an old 24-stall enginehouse and an adjacent brick and stone building formerly used as a power plant. Carson wondered as he looked around the shops if the old power plant hadn't died from exhaustion trying to keep up with the fast-growing collection of air-brake cylinders that his predecessor had installed. Regardless of the cause the old power plant building was now known as Car Shop A while the old enginehouse was designated as Shop B and together they had enough track capacity to spot 44 cars under cover at one time. In order, however, to work the progressive or "straight line" system and get somewhere near 50 cars a week, it was necessary to spot 72 cars in designated locations. Under these circumstances 28 cars were out in the open and in inclement weather this resulted in a loss of time at these positions which threw the entire production schedule out of line.

The fabrication of materials was responsible for numerous delays, it being necessary frequently to use from six to ten men daily out of each gang of 50 on this work, manufacturing such material as inside and outside hopper sheets for hopper cars, hopper doors, door closing angles, floor and side sheets, sill splices and cover plates. The facilities available for the manufacture of this material were so inadequate that at times the men hindered each other in the use of certain machines due to the lack of more than one machine on which certain work could be performed. After the material had been fabricated it was necessary to truck it to the cars by home-made conveyances, such as wheel-barrows, push and pull trucks, etc., which retarded the shop operation due to the fact that many carmen who should have been repairing cars were engaged in the manufacture and delivery of material.

It was not long before Carson began to see that the excessive cost of car repairs at Ridge Point shop was not so much a result of poor management as it was a lack of the proper tools and equipment to do the work. The whole layout bore the earmarks of a supervisor that either hadn't had enough interest in his shop to know that modern car work demands modern repair facilities or else didn't know how to present certain important facts relating to the work to those responsible for obtaining the authority to secure new facilities. The new locomotive shop across the tracks was conclusive evidence to Carson that the company was not averse to spending if the management could be shown that improvements were justified.

The newly appointed master car builder, under whom Carson had served as assistant general foreman for several years, had written him only that day asking for immediate advice as to the possibility of not only bringing the output at Ridge Point up to 50 cars a week but of increasing it in the very near future to 60 or 70 cars a week. A hasty survey of the situation brought two facts home to Carson—that a substantial increase in the force might get the increased output expected but that it was extremely doubtful if even more men could increase output materially with the facilities available. Here was a case that seemed to lead to but one conclusion—an immediate demand for modern facilities.

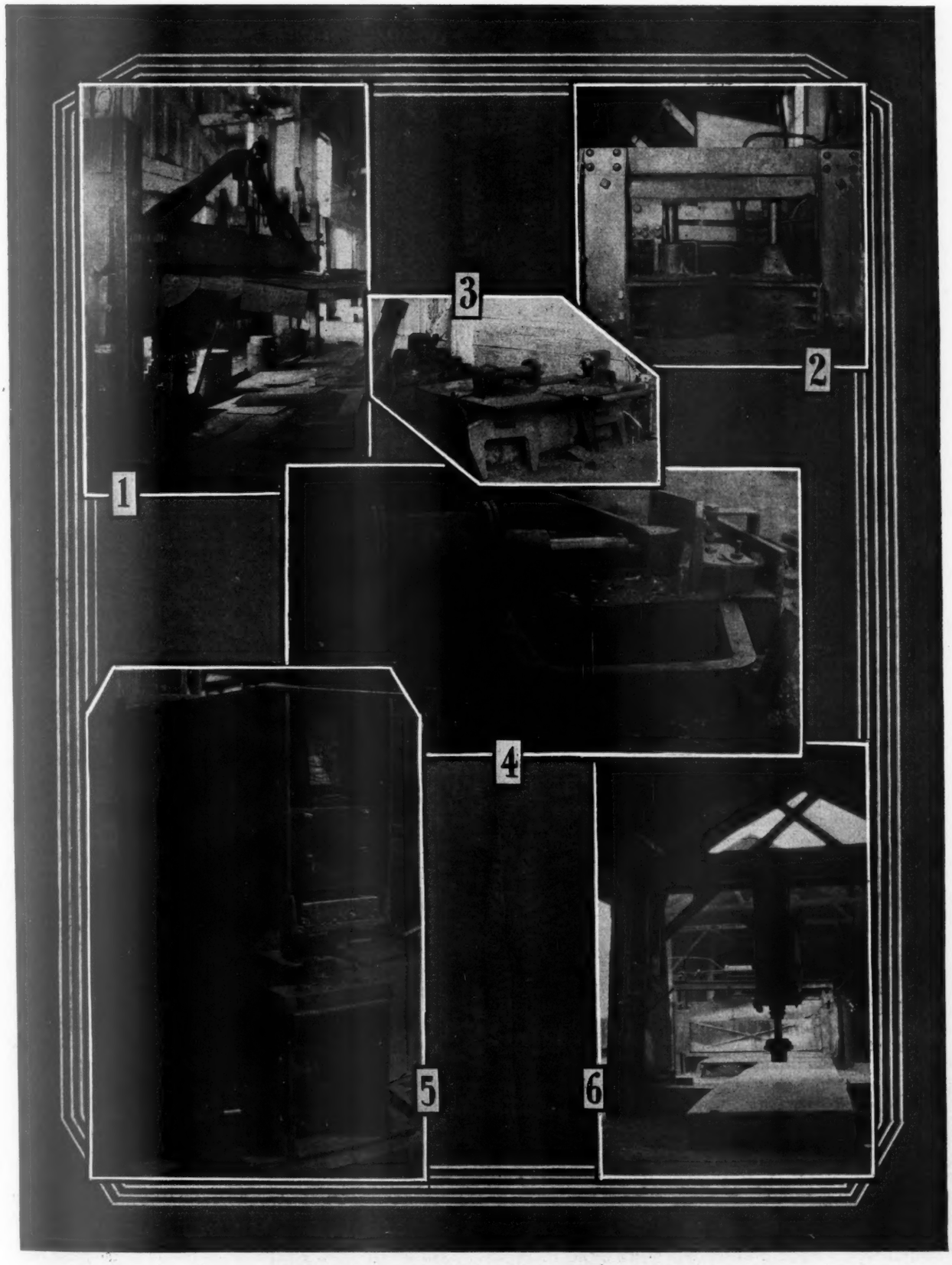


Proposed layout for the car-repair shop

Carson's analysis of the entire problem took preliminary form in four questions:

1—What do these antiquated facilities actually cost the company in loss of production?
2—What new facilities should be installed?
3—What would the proper facilities cost?
4—What would new facilities mean to the company in (a) increased output or (b) lowered unit cost?

The answer to the first question seemed quite simple. The records showed that the average output for a



Museum pieces with which all car foremen are familiar

1—A homemade angle press
2—A liberal user of compressed air
3—A coupler yoke riveter
4—A pneumatic bull dozer
5—A pneumatic punch—another liberal air user
6—A pneumatic straightening press

week was only 41 cars where 50 had been expected. Under the new set-up 70 cars a week were wanted. The present facilities would never produce the 70 cars and even good shop management probably could not raise the output much above 45 to 48 cars. The inadequate facilities at Ridge Point were costing his company the ability to repair 1,250 more cars a year at an average cost of $105 a car.

What New Facilities Should Be Installed?

Carson reasoned that there weren't any facilities at Ridge Point worth saving and that as long as he had to stake his future reputation on his ability to save the road money in the long run he might just as well ask for a complete new layout. The least they could do would be to turn him down. As he sat pondering over the problem, his gaze wandered out of the office window, across the tracks, to the new locomotive shops and engine terminal. He tried for a moment to view the problem from the standpoint of the management. "Why did they build those new locomotive shops?" he thought. The only answer he could provide was that the new shops were sorely needed and that someone in the locomotive department had been able to prove to the management that the expenditure could be justified. It was his job, therefore, to provide his department head with the true facts concerning Ridge Point car shops and to back up those facts with an intelligent recommendation for improvements in the line of buildings and equipment.

After many days and nights of study on the problem, Carson arrived at a point where he could say, with a degree of confidence, that traffic over the Lakewood Division was of sufficient volume and of such character to warrant the construction of car repair facilities adequate to turn out 80 heavy repair cars a week. This would amount to an increase of 45 cars a week over the best that could be expected from the present facilities without an increase in force.

Carson realized his inability to submit a complete detailed design and specification for a new shop or to estimate accurately the cost of a new shop. He did, however, feel that an increase in output of 45 cars a week without a material increase in force would justify an expenditure of from $700,000 to $800,000 for new shops and on this basis he prepared a recommendation to his master car builder for new facilities along the following general lines:

Buildings

Assembly Shop—A single building of steel and brick construction, 80 ft. by 900 ft., should be erected to replace the two existing buildings. Through the full length of this shop there should be four tracks with a 20-ft. driveway down the center of the shop and 10-ft. aisles between the outer two tracks on either side of the shop. The floor should be of concrete or wood block and the sides and ends of the building fitted with metal sash to open outward in order that an abundance of natural light and ventilation will be available at all times. This shop should be equipped with two overhead electric traveling cranes of ample capacity—one on either side of the building and each serving two of the repair tracks.

Wheel Shop and Blacksmith Shop—Adjoining the assembly shop at a location 150 ft. from the end of the shop there should be a wheel shop 40 ft. by 40 ft. Next to the wheel shop on one side should be located a 40-ft. by 150-ft. wheel-storage platform and on the other side a 40-ft. by 40-ft. blacksmith shop. Outside the blacksmith shop a 10-ft. by 12-ft. gas-fired furnace should be provided.

Storehouse and Material Platforms—Adjacent to the main shop and adjoining the blacksmith shop there should be a 40-ft. by 30-ft. building provided for the storage of bolts, nuts, rivets, journal bearings and other materials that are affected by exposure. Next to this, there should be erected a platform 40 ft. by 580 ft. of either concrete or wood block, preferably provided with umbrella sheds. On this platform should be erected facilities for storing fabricated parts. (It is not the idea to fabricate parts at the new Ridge Point Shop. Such parts should either be furnished from a central shop at another point or purchased in fabricated form on the outside.) Aisles and driveways should be provided through and around the material storage platforms to facilitate the use of electric trucks.

At the extreme opposite end of the assembly shop from the wheel storage platform should be erected a 20-ft. by 60-ft. steel and brick leanto. In this section a 10-ft. by 20-ft. space is provided for the paint shop; a similar space to be used as an oil house; a 20-ft. by 20-ft. space for the air-brake shop; and at the end a 20-ft. by 20-ft. office space. This office space should be used as a general office and be available for use by the supervisors in charge of the work as a place where they can make out the various reports and forms incidental to the work.

Lumber Yard—For the reason that composite cars must be rebuilt, a space must be set aside for lumber storage. This storage space should be located in close proximity to the assembly shop so as to be accessible to crane facilities, thereby permitting the lumber to be handled directly from the storage yard to the point where it is applied to the cars.

Shop Machinery and Tools

Car Shop—Main Building—In addition to the two overhead traveling electric cranes, which are to be used for the handling of hopper-car sides, floors, lumber, trucks, etc., and which have a traveling range of the entire shop space the following electric jib cranes are a necessity: One each, located at the bench where hopper car sides are fitted up and riveted with a gap riveter preparatory to being hung on the cars; at the hopper-door bench at which point all hopper doors are completely assembled and made ready for their application to the cars as they progress past this spot, and at the bench where car ends are prepared for application to gondola cars.

A double-end emery grinder should be located in a convenient place near the spot where woodwork is performed on the composite type cars for use of the carmen in sharpening their edged tools.

Wheel Shop—Located to the best advantage the following equipment is essential to the proper handling of wheels and axles in the wheel shop:

Emery grinder for dressing up cutting tools.
Hydraulic wheel press equipped with recording gage.
48-in. car-wheel borer with mechanical wheel-handling and hub-facing attachments.
Wheel lathe for steel wheels.
Journal-turning and axle-burnishing lathe.

Three electric hoists for handling the axles and mounted car wheels to and from the wheel press, a wheel lathe and journal-turning and car-axle burnishing lathes must be provided.

Oil House—The equipment in the oil house must conform to the present A.R.A. standard practices. Vats and reclamation facilities to be provided which will produce results in accordance with the A.R.A. specifi-

cations and so located as to require the least amount of space.

Paint Shop—A modern spray-painting system, including paint storage tanks, spray guns of various sizes, exhaust fans and approved lighting fixtures, is recommended.

Blacksmith Shop and Fabricating Plant—A gas or oil heating furnace, 10 ft. in width 12 ft. in length and having a depth of 36 in., should be located just outside of the blacksmith shop for use in straightening large steel-car parts which it is possible to reclaim for further use and which can also be used for reclaiming by straightening accumulations of smaller parts such as sill steps, grab irons, ladders, etc. Cast steel truck side frames and bolsters can be annealed in this furnace during the electric welding process.

Two small forges should be sufficient for use by blacksmiths in welding of materials and for heating of such items as yoke rivets, etc.

A riveter for driving coupler yoke rivets should be provided.

One 1,500-ton, four-column flanging press should be installed for use in forming steel car parts, also a rotary shear for cutting up steel for use in splices, sill extensions, etc. A punch and shear, capable of shearing angles, Cambria section side stakes, round and bar iron stock must be provided.

Two electric hoists for use at the punch and shear and at the flanging press will greatly facilitate the handling of heavy sheet steel and steel car parts, and will eliminate the necessity of having the industrial electric trucks handle this work.

The air for use at the steel straightening furnace and at the small forges can be supplied by electrically driven unit blast fans, which is more economical than air furnished by compressors.

Air Brake Shop—A 1,500-cu.-ft. electrically driven air compressor, together with a 500 cu.-ft. capacity compressor to be used as an auxiliary, is located in the locomotive department power plant and supplies air pressure for car department use.

For the testing of various types of freight car triple valves a Westinghouse 3-T triple valve test rack should be installed. Four pneumatic vises for bench use in repairing triple valves, a ¾-hp. electric motor with an 1,800 r.p.m. reduction unit for use in grinding in check valves, a five-spindle semi-automatic reciprocating lapping machine for lapping in slide valves and seats together with sufficient reamers, special files, wrenches and other miscellaneous tools should be supplied to equip the air brake shop in a proper manner to handle the repairs to triple valves, 80 of which must be handled daily to care for the demand for both light-repair cars and those on cars being rebuilt.

A four-unit grinding machine for use in grinding in angle and cut-out cocks together with pneumatic devices for use in stripping and re-mounting of air hose is essential.

Sufficient trays for the transporting of triple valves, angle and cut-out cocks and air hose to and from the air brake shop together with an industrial lift truck will bring the cost of handling down to a minimum.

For the handling of pipe and nipples the following equipment is desirable:

One pipe and nipple threading machine.
Two pneumatic pipe vises.
One pneumatic pipe bending device.

Electric Welding—The motor generator set for use in electric welding of car parts such as building up collars on journals, welding center plates, side truck frames, bolsters and building up worn surfaces on coupler parts is recommended.

Cutting Torches—Due to the low cost of city gas, it is recommended that gas lines be laid throughout the car shop and the low pressure-type cutting torches be used in place of acetylene gas. City gas can be purchased for about 70 cents a 1,000 cu. ft. while acetylene gas costs $30.00 per 1,000 cu. ft. plus the maintenance cost of the plant in which it is manufactured.

Rivet Heaters—Due to increased efficiency of electric rivet heaters it is recommended that the costs of operation compared to the gas or oil type be investigated.

Tool Room—One of the most important facilities of a car shop is a good tool room, where an abundance of tools is available for immediate use when required. Air motors and riveting hammers of any of the standard makes are now being manufactured to a high standard of workmanship and excellent results can be obtained if they are properly maintained. Reamers, drills, extensions, button sets, plungers, dolly bars, wrenches, hammers, chisels, mauls, push and pull jacks, blow torches, jacks, etc., should be kept in the tool room and issued as required after having been thoroughly inspected and conditioned for use. Pneumatic nail driving machines for use in nailing down floors in composite cars have been found to be both time and labor savers. Pneumatic column and box bolt tightening machines placed in the truck spots of each track must be provided to facilitate the work at this point.

Miscellaneous—Four portable crane trucks are required to handle material, scrap, etc., while cars are undergoing repairs. Scrap boxes must be provided at designated points which can also be handled by the crane trucks. Two gasoline tractors should also be provided for the shifting of cars inside of the shop.

* * * * * * * * *

It was spring, several months having elapsed since Carson had prepared his data for the construction of a modern car shop. The annual spring cleaning and painting was taking place, stations, bridges, signal towers, telegraph offices and buildings in general were being painted. New rail was being laid on the main line and that removed was being placed on branch lines and sidings. A new turn table was being installed at the engine house and improvements of all kinds were in order.

Through careful selection of bad-order cars for shopping and the close attention of the entire car-shop organization, it had been possible for Carson to meet the scheduled output of 50 rebuilt cars for a period of eight weeks in succession. While this was satisfactory to the master car builder, it did not entirely satisfy Carson who still believed that with the proper facilities and the same number of men that it would be possible to increase this output 30 cars each week or turn out a total of 80 rebuilt cars each week with less effort on the part of the local supervision than was now required to turn out the 50 cars.

The Inspection Party

Everything was in readiness for the president's inspection. He was accompanied by two vice-presidents, the general manager, the chief engineer, the superintendent of motive power, the master car builder and local divisional officers. Several shops had been visited by the party and many criticisms and compliments had been offered during the trip. There was a tense feeling at Ridge Point when the special train came to a stop at the shop crossing.

(*Concluded on page 330*)

Making guide bolts complete in 12 minutes

The Turret Lathe—A General Purpose Tool

A machine shop foreman tells how locomotive parts can be made on a turret lathe

By "M. S. Foreman"

THE manufacturing of locomotive parts in quantities for economical production in railroad shops is now receiving more attention than the subject has ever received in the past. The old idea that the railroads still use a hand-to-mouth method of manufacturing material has been superseded by the new idea of manufacturing in large quantities. The number of parts of any particular item of material is based on past consumption and the orders for replacements are placed in accordance with this consumption.

Carrying the thought further, the materials might also be classed in two divisions, namely; major and minor items. The major items of material are those items that are turned over rapidly and currently by the stores department, and the minor items of material are those which are used only occasionally. However, the rolling equipment must be protected by carrying some of these items on hand at all times.

Some railroads have been able to make a decided improvement through the application of a scheduling system, while others have not made as much progress. Various systems are in use which tend toward improved shop practices. The railroads as a whole have made a good showing in this respect, while on some individual lines there is room for improvement. There can still be a reduction in the number of days a locomotive is held out of service for classified repairs.

Decreasing the Work in the Erecting Shop

The work in the erecting shop can be decreased by adopting the system of sending the various parts of the locomotive to the erecting shop from the machine sections in units instead of piecemeal. With this method, the spring rigging would be fitted up, with pins, etc., ready for application to the locomotive; the valve gear, piston-rod packing, driving boxes, etc., would be fitted up and sent to the erecting shop as a complete unit, and all the fitting-up and assembling of the various appurtenances and appliances would be handled in the same manner. A complete set of check gages, trams, etc., should be used for checking each assembly.

The turret lathe plays an important part in this program of reducing the days out of service for locomotives receiving classified repairs. There should be no delay waiting for any kind of locomotive material in a shop where a good system for manufacturing locomotive parts is in use and parts made in sufficient quantities to take care of current needs. The machinery for the locomotive should be well under way before the locomotive is shopped.

A different system of shopping locomotives may have to be inaugurated in order to carry out such a program. There can be no reason for placing 30 or more engines in a shop at one time where there are not enough men to make repairs to less than half that number. One of the greatest assets of the modern locomotive shop is to have the material on hand finished when needed. Extra parts worked up on shop orders and placed in stock where it will be ready when needed will do more to increase the output or reduce the days out of service for locomotives shopped for classified repairs than any other one single factor governing shop output.

To handle the work on this basis, careful consideration should be given the selection of the machine tools to be used for the production of parts in locomotive shops. In connection with the selection of the machines tools there should also be a system of standardizing all parts that are used in quantities, such as pins and bushings for the various types of valve gears. Both the steel and bronze bushings should be included, and the pins for the valve gears should be added to the list, as well as the pins and bushings for locomotive spring rigging.

Finished Parts Should be Available to Meet the Shop Schedule

A schedule should also be worked out with the stores department, whereby all material could be ordered on the shops by placing serial shop orders, the costs of the material charged to the shop orders, and the material placed in stock until needed. When needed, the material should be drawn on regular material tickets and charged to the locomotive on which it is applied. Material should be ordered on the shops in quantities that justify setting up a machine for manufacturing on an economical basis.

The turret lathe is one of the most important machines used in the railroad shop in carrying out any program of manufacturing locomotive parts and parts for the appurtenances used on the modern locomotive. The parts that can be made on the turret lathe fortunately come under the heading of that vast list of parts which by their design and location on the locomotive have to be renewed at frequent intervals, because of the excessive wear-producing service these parts receive. The list includes knuckle pins and bushings, side-rod brasses, floating bushings, boiler plugs, staybolts, staybolt sleeves and bushings, and boiler fittings, as well as many other items.

Cataloging Parts Saves Time

A considerable saving may be made by grouping and cataloging all locomotive parts and standardizing as far as possible. All spring rigging pins and the bushings should be grouped and shown in one catalog, and the pins and bushings should be made interchangeable as far as possible. The material should be placed in stock and should be available when needed. All parts should be ordered by a number and no dimensions should be necessary on the order. There should be no delay of power undergoing repairs by waiting for the shops to make such items of material as bushings, pins, nuts, bolts and other small items, and there is little reason for waiting for the larger items of material.

All the pins and bushings used on a valve gear should be cataloged in the same manner. The bushings and pins should be made in three sizes: standard, first-oversize and second-oversize. No material should be used when the dimensions exceed the second-oversize.

Boiler or cylinder-head studs are made complete on this turret lathe—Average production 40 studs per hour

Oversizes and limitations should be placed on the drawings for reaming holes and when the holes have reached the second oversize dimensions, they should be plugged and restored to the original dimensions. No satisfactory system for handling duplicate parts can be worked out with a large number of different sizes.

All nuts, swivels and connections for water glasses, gage cocks, water bottles and other water-level indicating devices should be grouped and cataloged in the same manner. The grouping of materials of all kinds should save money, as there is an opportunity to eliminate excessive material and the stocking of obsolete parts.

Frame bolts and all kinds of tapered bolts, set screws, standard-thread studs, boiler-thread studs, and butt studs, both the standard-thread and twelve-thread studs, should be cataloged and carried in stock by numbers.

This applies to staybolts of all dimensions, flexible and rigid, as well as to the caps, sleeves, etc., for these bolts. In fact, there is an opportunity for reducing the costs, as well as the time for giving locomotives class repairs by having material ready when needed. If all parts are worked to a certain predetermined and specified size or dimension, time and material can be saved in overhauling valves, valve gears, or side rods, both main and parallel. There should be no waste of material in using such a system. Eventually, the parts of one locomotive would become interchangeable with those of another locomotive of the same class.

Knuckle pins and bushings and knuckle pin nuts and washers, crosshead pins, crosshead-pin nuts, washers and collars could also be cataloged in the same manner and carried in stock either finished or semi-finished. Most of this work can be handled on the turret lathe. By the use of special tooling, jigs, fixtures and devices the range of the turret lathe in the railroad shop can be extended considerably.

Selecting a Turret Lathe

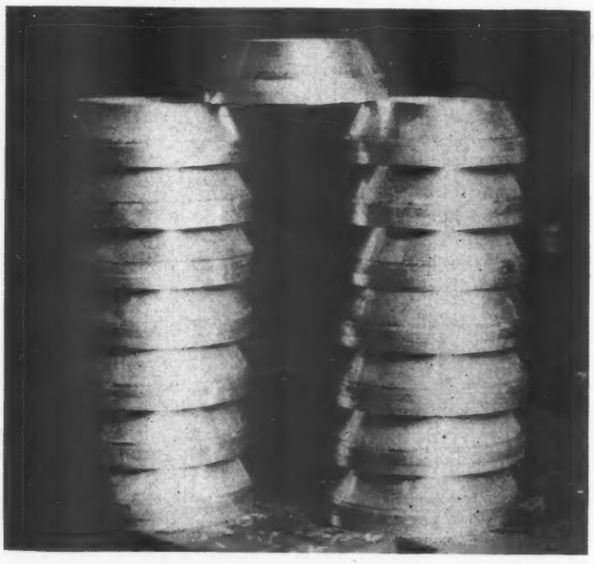
In the selection of a turret lathe for railroad shop work it is well to consider the class and size of the locomotives that are handled in the particular shop in which the machine is to be installed. For instance, in a shop where the heavier 2-8-8-2 type locomotives are handled, machines of the largest capacity are suggested, as well as machines of the smaller sizes. For handling cast-steel piston centers, valve bodies, division rings, followers and bull rings, a machine of 28-in. swing and upwards is required, while a smaller machine can handle the other work. Each machine used for the heavier class of work, such as that just mentioned and crank pins, should be equipped with a loading device designed and built as an integral part of the machine. This device should operate by controls within easy reach of the operator. It should be rapid and safe.

Turret lathes should not be located in groups. Such a system of placing machines results in loss of time and labor in transporting material from one place to another in the shop. The shop should be divided into sections as follows: Wheels and axles; rods, connecting and parallel; crossheads and pistons; valves and valve gears; steam pipes, slip joints, piston and valve-stem packing. Each section should have all the machines necessary for doing the work on the particular part of the locomotive assigned to it. For instance, in the rod section the writer would suggest an 18-in. turret lathe for the knuckle pins, knuckle-pin bushings, nuts and collars or washers, and a 24-in. turret lathe for the parallel rod bushings, casings and other work.

When purchasing turret lathes for a railroad shop, the machine should come with the usual equipment, no special tooling or set-up being ordered. This should be ordered to meet local requirements. Roughing box tools, finishing box tools and taper turners should come with the machine, as well as roller stock stand supports, etc., and any special tools and equipment that may be required can be ordered later. In shops handling compound articulated locomotives, due consideration should be given the parts for the low-pressure engines. These parts are much larger than the high-pressure parts. In shops handling simple locomotives, the machines required may be somewhat smaller owing to the fact that the parts are not as large or heavy.

Centralized Manufacturing

Reference to the use of the turret lathe here is for the efficient and economical manufacture of parts and not for the repairing of a few parts. The writer would stress the point of making the parts of one shop which is centrally located, or two such shops, as the conditions justify, and shipping the material to the division storehouse for distribution to the smaller, outlying repair shops. This would enable the main shops to make larger quantities and thus reduce the costs.



Fifteen sets of valve-stem packing produced in eight hours on a turret lathe

This feature of handling the work is being rapidly expanded on many roads. Practically no machine work is necessary in the smaller shops. In enginehouses particularly, the time of the men is spent in the maintenance of the power and the work requiring constant attention. This reduces the time for turning locomotives and also has a marked tendency to reduce engine failures.

The Turret Lathe is Not a Single-Purpose Machine

An idea has been prevalent among railroad shop men that the turret lathe is too complicated for use in the railroad shop. This impression is misleading. The turret lathe is a highly productive machine and is not what could be termed a specialized or single-purpose machine. It can handle a wide range of work.

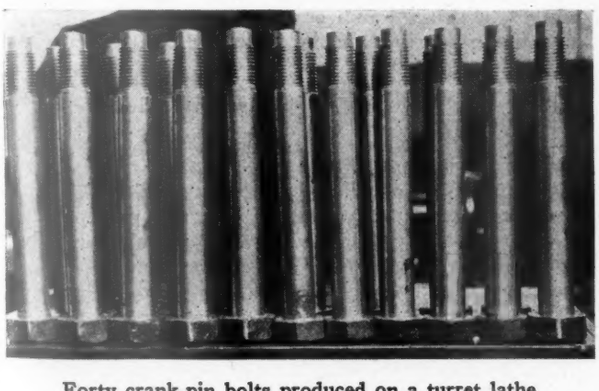
A wide field open to the turret lathe is the production of packing rings. Hundreds of packing rings of all

shapes and sizes are used annually in railroad shops. For the larger packing rings, as well as the smaller rings, the turret lathe will be found just as efficient as any other type of machine. The packing rings should be cataloged in the same manner as the other parts, all rings grouped according to the sizes and purposes and shown in the catalog by number. The rings can be made up in lots of twenty-five to several hundred and placed in stock in the storehouse ready for use.

Special mandrels, chucks, etc., should be used for making the rings. They should be semi-finished on the outside diameters, cut and then clamped on the mandrels and the outside diameters turned to the exact size so that when they are used it will be unnecessary to file or fit them. This will produce a good round ring.

Twenty-four 12-inch piston rings finished complete on a turret lathe in eight hours

There are many different kinds of rings. The valve rings for the main piston valves are made in lots of 100 to 250 and upwards in the larger shops. Some of these rings are straight rings, some are Z-rings, while others are L-rings. Special forming tools are used for making the rings. Each ring is made to a special gage and inspected and stencilled before being delivered to the stores department. The handling of valve rings, cylinder-packing rings, air-pump packing rings, bell-ringer rings, grate-shaker cylinder rings, steam-pipe slip-joint rings, receiver-pipe slip-joint rings, stoker-



Forty crank-pin bolts produced on a turret lathe in nine hours

engine cylinder packing rings, by-pass valve rings and many other rings by this method will save time, and better results can be secured from the application of the packing rings.

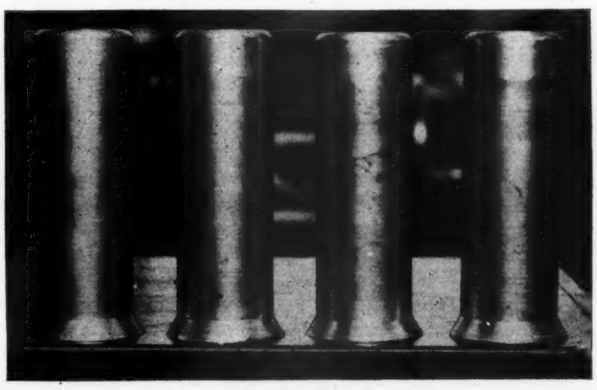
Turning Tapered Frame Bolts

The fitting of tapered frame bolts is one of the most important jobs in the railroad shop, and special attention should be given this part of the work. A good round bolt with a true taper can be produced on the turret lathe in much less time than the same bolt can be produced on an engine lathe. The bolts should be made in quantities and the holes reamed to fit the bolts, instead of using the older method of reaming the holes and fitting each bolt individually to the holes. Much time can be saved by having the bolts on hand as needed. By using of standard ring gages, cataloging the bolts and carrying the various sizes of bolts in the storehouse, a mechanic can get the bolts needed and drive them in the holes as the holes are reamed. This same system is applicable to all kinds of tapered or straight turned bolts.

A wide range of chucking work can also be handled on the turret lathe. Most railroad shops have confined their turret lathes to bar work alone and have failed to consider the machine for chucking work. This feature alone should stress the importance of the turret lathe in the railroad shop. The turret lathe will do anything the engine lathe will do and more, and what it does is done faster and better. There is no filing and hand polishing on a turret lathe; the rollers do this job.

There is an unlimited field for the turret lathe on brass work. Nuts, swivels, plugs, fittings of all kinds, bushings and other parts to be made in large quantities can be handled to good advantage.

The popularity of the turret lathe is gradually increasing in the railroad shop due to the fact that some



Engine truck swing-link pins roughed and finished on a turret lathe—Production of four per hour

of the manufacturers are equipping their machines with thread-chasing equipment. The smaller sizes of turret lathe are especially suitable for handling stay-bolts. Turret lathes will handle this work in the shop where the number of bolts and amount of this kind of material will not permit the installation of the single-purpose, four- to six-spindle staybolt machines. The bolts can be threaded on the turret lathe and the caps and sleeves can also be made on these machines. Special equipment can be secured for handling this work.

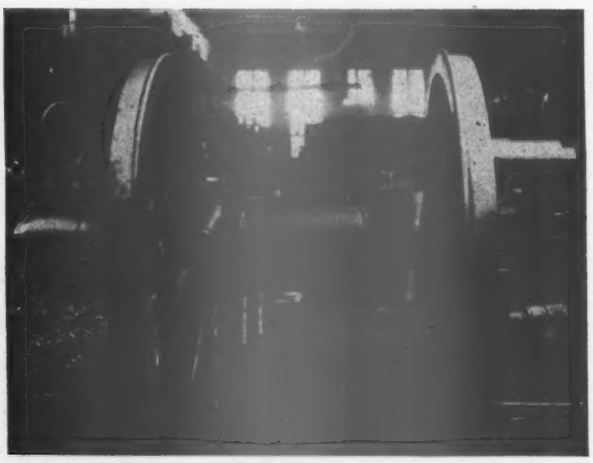
The modern turret lathe, equipped with two turning heads, will be found a valuable addition to any railroad shop where driving-wheel axles, engine-truck axles, or trailing-truck axles are roughed out, semi-finished or finished for shipment to outlying repair shops. Both journals can be machined simultaneously. In fact, by using a special driving arrangement, the entire axle may be machined with one set up; that is, it will not be necessary to change ends with the axle during the process of machining the axle from the rough.

Roller-bearing locomotive built for the Timken Roller Bear

Timken Roller-Bearing Locomotive

All axle journals equipped with roller bearings—Weights on wheels can be adjusted for either 235- or 250-lb. boiler pressure

THE Timken Roller Bearing Company recently received a 4-8-4 type locomotive from the American Locomotive Company, all the axle journals of which are equipped with Timken roller bearings. This locomotive, which was built primarily to demonstrate the practicability of roller bearings in locomotive service, was first operated on the New York Central and was then delivered to the Pennsylvania for further tests in both passenger and freight service. Fifty-three locomotive specialty manufacturers co-operated with the Timken Company in the building of this locomotive.



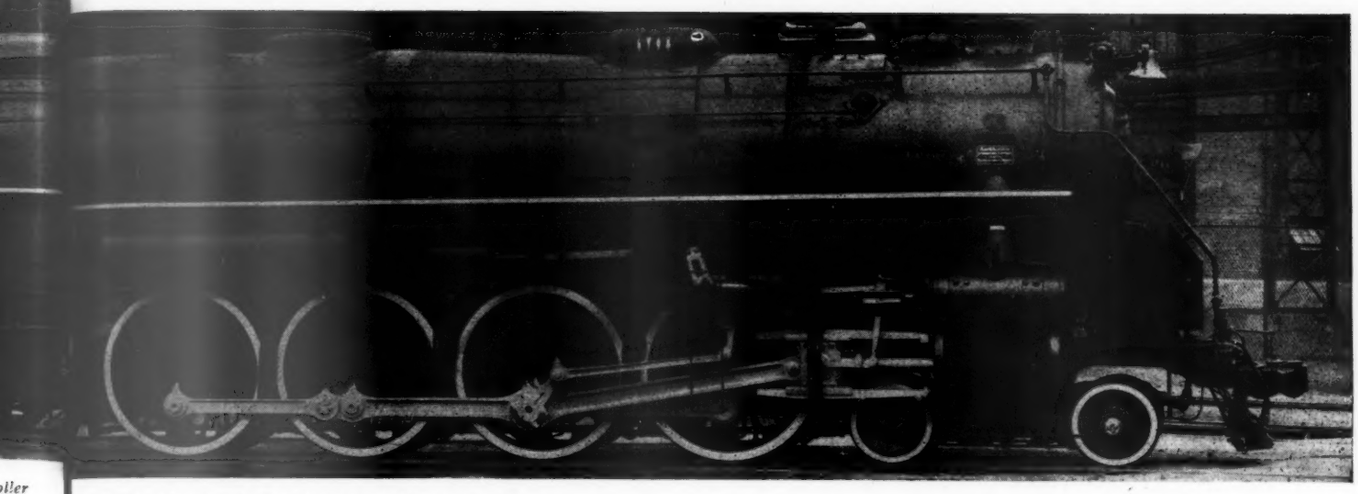
The assembled driving-wheel unit

A number of innovations in locomotive design have been worked out by the Timken Company, in co-operation with the builder, to meet the special requirements of the roller-bearing installations. These include parallel pedestal jaws for the driving axle housings and the use of a variety of heat-treated alloy steels for numerous details to provide for long life and light weight, with minimum wear. The mounting and housing of the bearings on the axles are of Timken design throughout.

Driver Weights Adjustable

An interesting feature in the design is the duplex weight distribution and steam pressure. It will be noted from the table showing the dimensions, weights and proportions, that two different steam pressures and weights on the engine drivers and trucks are given. It is the purpose of the Timken Company to loan this locomotive without rental charges to those railroads interested in its operation. For that reason provision has been made for adjusting the weights partly by means of Townsend adjustable equalizer fulcrum blocks for the main equalizers between the drivers and the trailing truck. The front weight adjustments are taken care of by changing the equalization in the usual manner. Roads having an axle load limit of 62,000 lb. or less operate the locomotive at a boiler pressure of 235 lb. This is increased to a working pressure of 250 lb. for all roads allowing an axle load of over 62,000 lb.

The cylinders have a diameter of 27 in. and a stroke of 30 in. The diameter of the drivers is 73 in. The



Bearing Company by the American Locomotive Company

total weight of the engine is 417,500 lb. At a boiler pressure of 235 lb. this weight is distributed with 246,000 lb. on the drivers and the locomotive develops a maximum starting tractive force of 71,900 lb. including the booster. At a boiler pressure of 250 lb., 264,000 lb. is carried on the drivers and under these conditions the maximum starting tractive force, including the booster, is 76,500 lb.

Considerations Influencing the Design

In considering measures to demonstrate the feasibility of applying roller bearings to all axles of a steam locomotive, the decision to build a new locomotive, rather than to reconstruct an existing engine owned or operated by some railroad, was made to afford any railroad interested the opportunity to make tests without restriction. It is realized, however, that a locomotive of the type desired would be restricted on account of weight and clearance limitations which exist on a number of roads where tests would naturally be contemplated. These conditions led to the adoption of the 4-8-4 type of wheel arrangement and to the provisions for two adjustments of the weight on the driving wheels.

The application of roller bearings on the driving axles removed the limitations on safe speeds of operation, so far as affected by bearing conditions. It was apparent that, by careful attention to the detail design of the reciprocating parts, the selection of materials, the size of the drivers and the proportioning of the cylinders, a near approach to the ideal locomotive for operation under widely varying conditions, having the conventional type of boiler, could be attained. This was the basic reason for the 73-in. drivers, 27-in. by 30-in. cylinders and the 250-lb. steam pressure, with the result that a locomotive was built with ample boiler capacity and within the weight and clearance limitations required for service on most railroads in the United States and Canada.

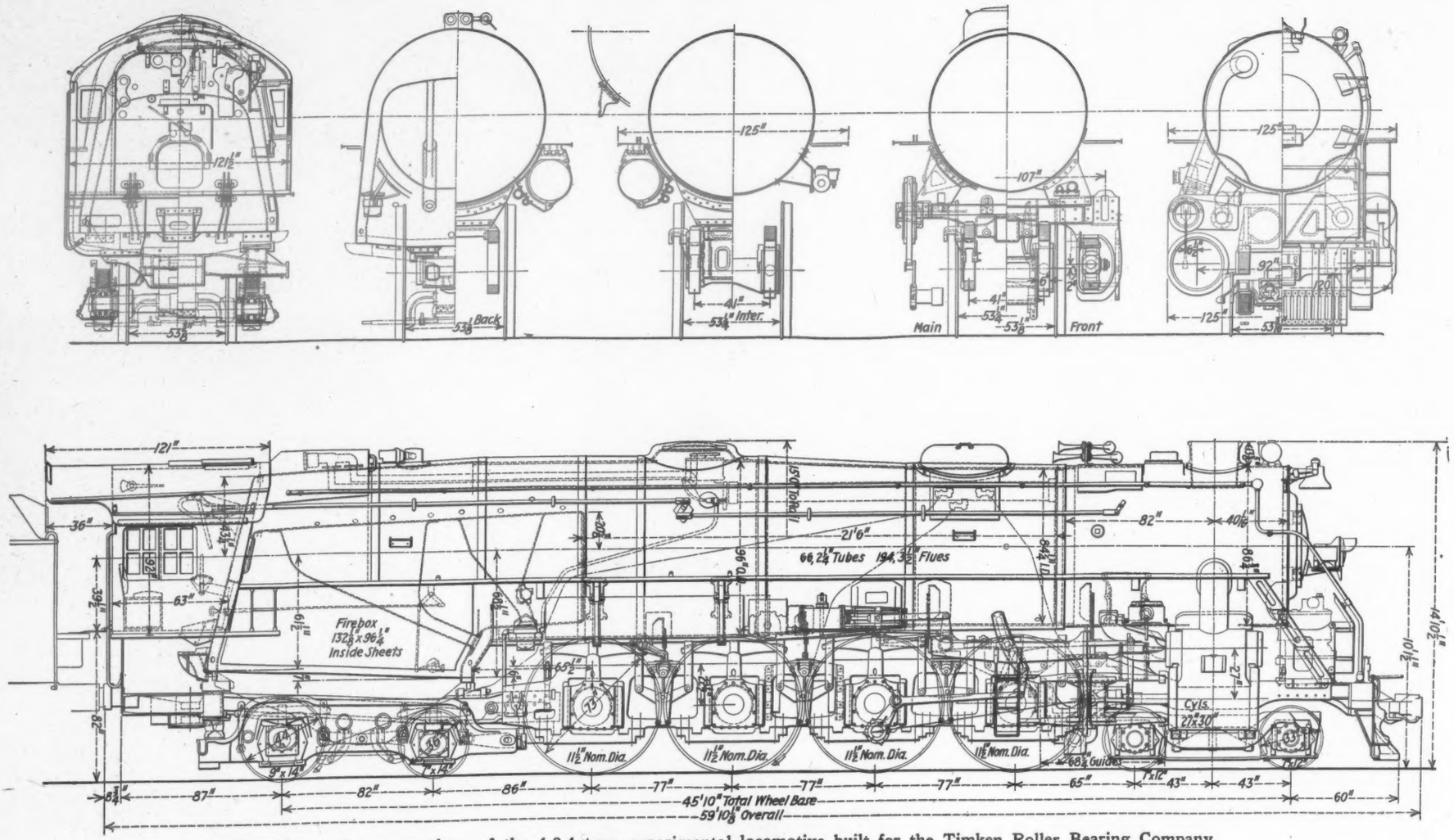
The speed specification submitted by the owners to the builders called for a maximum speed of 85 m.p.h., with a dynamic augment within the limitations ordinarily specified for locomotives of this general type at diameter speeds. The calculations indicated that this permissible speed could be obtained by the use of heat-treated one-piece pistons, heat-treated hollow piston rods, heat-treated nickel-vanadium steel cross heads and normalized main and side rods of 2¾-per-cent nickel steel. These features effected a reduction of approximately 460 lb. in the weight of the reciprocating parts on each side of the engine. Careful attention was given to counterbalancing and the main drivers are cross-balanced. The counterbalancing permits operation at a speed exceeding 85 m.p.h. without exceeding a dynamic augment of 10,000 lb.

Roller Bearings Applied to all Axle Journals

The application of the Timken bearings and housings to the driving axles is shown in one of the drawings. It will be noted that the roller bearing provides a full 360-deg. bearing as compared with the half bearing of the customary crown brass. The thrust of the piston is resisted by a full 180 deg. of bearing. The service advantage of a roller bearing over a long period can only be obtained by maintaining correct longitudinal spacing of the drivers and side rods. For that reason no adjustable feature, such as shoes and wedges, has been applied.

The need of using materials that would have sufficient

The tender journal box

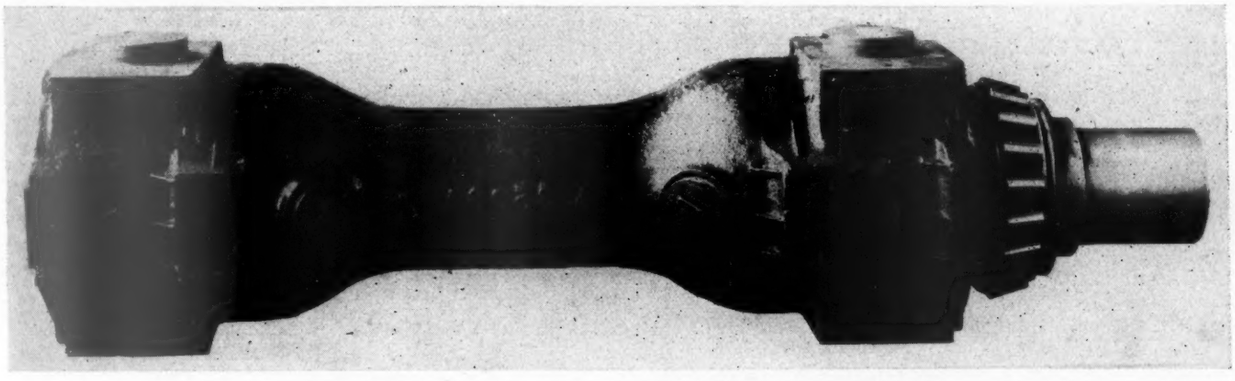


Elevation and cross-sections of the 4-8-4 type experimental locomotive built for the Timken Roller Bearing Company by the American Locomotive Company

wearing qualities to eliminate the use of adjustable features led to the development of a complete hardened-steel train of parts in the mounting of the driving bearings in the frame. As shown in the drawing, the bearing housing, which is a one-piece steel casting of one-per-cent nickel steel, hardened and ground at all fits, extends across the locomotive between the journals, completely surrounding the axle. A hardened and ground outer raceway of Timken alloy steel is pressed in each end of the housing and the inner raceways of the same material are pressed on the axle. The diameter of all the driving axles at the bearings is 11½ in. and the diameter at the wheel fits is reduced 1/64 in. below that size.

Table Showing the Principal Weights and Dimensions of the Timken Roller Bearing Company Locomotive

Owner	Timken Roller Bearing Company
Builder	American Locomotive Company
Type of locomotive	4-8-4
Service	Freight and passenger
Maximum rated tractive force (boiler pressure 235 lb.)	59,900 lb.
Rated tractive force of booster (boiler pressure 235 lb.)	12,000 lb.
Tractive force at starting (boiler pressure 235 lb.)	71,900 lb.
Maximum rated tractive force (boiler pressure 250 lb.)	63,700 lb.
Rated tractive force of booster (boiler pressure 250 lb.)	12,800 lb.
Tractive force at starting (boiler pressure 250 lb.)	76,500 lb.
Weight on drivers ÷ tractive force (boiler pressure 235 lb.)	4.10
Weight on drivers ÷ tractive force (boiler pressure 250 lb.)	4.14
Cylinders, diameter and stroke	27 in. by 30 in.
Valve gear, type	Walschaert
Valves, piston type, size	12 in.
Maximum travel	8½ in.
Steam lap	1½ in.
Exhaust clearance	¼ in.
Lead in full gear	¼ in.
Cut-off in full gear, per cent	70
Weights in working order (boiler pressure 235 lb.):	
On drivers	246,000 lb.
On trailing truck, front	48,500 lb.
On trailing truck, rear	55,500 lb.
On front truck	67,500 lb.
Total engine	417,500 lb.
Weights in working order (boiler pressure 250 lb.):	
On drivers	264,000 lb.
On trailing truck, front	34,500 lb.
On trailing truck, rear	59,000 lb.
On front truck	60,000 lb.
Total engine	417,500 lb.
Total tender	294,000 lb.
Total engine and tender	711,500 lb.
Wheel bases:	
Driving	19 ft. 3 in.
Driving, rigid	12 ft. 10 in.
Total engine	45 ft. 10 in.
Total engine and tender	89 ft. 9¼ in.
Wheels, diameter outside tires:	
Driving	73 in.
Trailing truck, front	36 in.
Trailing truck, rear	44 in.
Front truck	33 in.
Journals, nominal diameter:	
Driving, main	11½ in.
Driving, others	11½ in.
Trailing truck, front	7 in. by 14 in.
Trailing truck, rear	9 in. by 14 in.
Front truck	7 in. by 12 in.
Boiler:	
Type	Extended wagon top
Steam pressure (weight on drivers 246,000 lb.)	235 lb.
Steam pressure (weight on drivers 264,000 lb.)	250 lb.
Diameter, first ring, inside	84¼ in.
Tubes, number and diameter	66—2¼ in.
Flues, number and diameter	194—3½ in.
Length over tube sheets	21 ft. 6 in.
Grate area	88.3 sq. ft.
Heating surfaces:	
Firebox and combustion chamber	360 sq. ft.
Arch tubes	18 sq. ft.
Thermic syphons	105 sq. ft.
Tubes and flues	4,637 sq. ft.
Total evaporative	5,120 sq. ft.
Superheating	2,157 sq. ft.
Combined evap. and superheating	7,277 sq. ft.
Tender:	
Water capacity	14,200 gal.
Fuel capacity	21 tons
Wheels, diameter, outside tires	33 in.
Journals, diameter and length	6 in. by 12 in.
Weight proportions (boiler pressure 235 lb.):	
Weight on drivers ÷ total engine weight, per cent	59
Weight on drivers ÷ tractive force	4.10
Total weight engine ÷ comb. heating surface	57.4
Boiler proportions (boiler pressure 235 lb.):	
Tractive force ÷ comb. heat. surface	8.24
Tractive force × diam. drivers ÷ comb. heating surface	602
Firebox heating surface ÷ grate area	5.47
Firebox heating surface, per cent of evap. heating surface	9.44
Combined heat. surface ÷ grate area	82.4
Weight proportions (boiler pressure 250 lb.):	
Weight on drivers ÷ total engine weight, per cent	63.4
Weight on drivers ÷ tractive force	4.14
Boiler proportions (boiler pressure 250 lb.):	
Tractive force ÷ comb. heat. surface	8.77
Tractive force × diam. drivers ÷ comb. heating surface	639



Engine-truck axle and bearing partially inserted in the housing

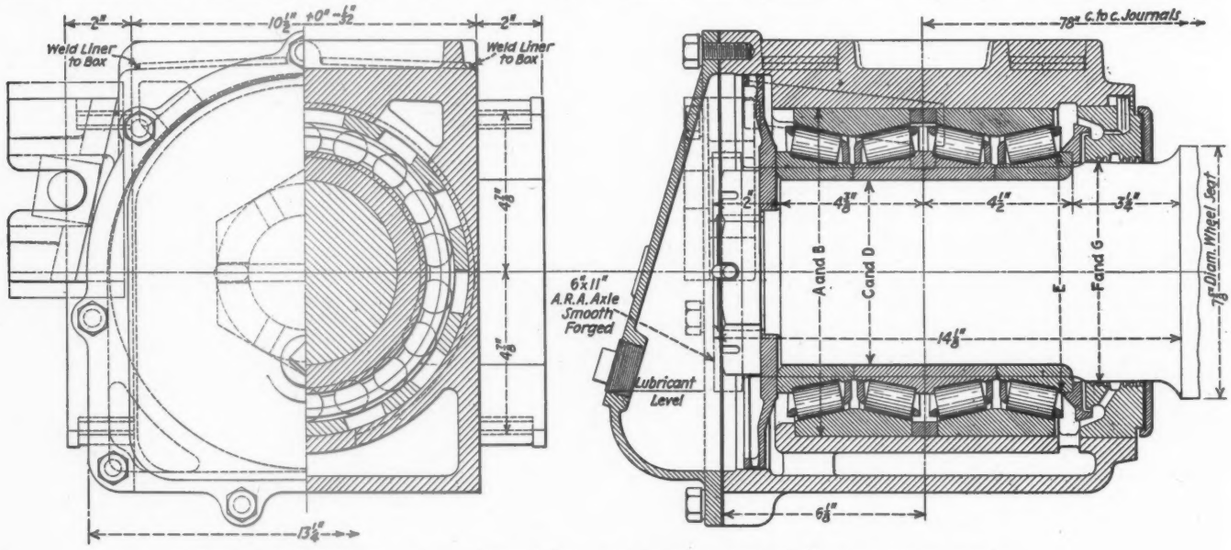
It is evident that the housing, which replaces the customary crown brass driving boxes, permits of no movement between itself and the axle, except that of the rotation of the axle, and that thrust stresses between the wheels and the frames must be transmitted from the frames through the housing and thence through the bearing to the axle. Ordinarily, angular movement of the axle and box in a vertical plane is provided for by the so-called hour-glass form of driving box flanges, which reduce the contact area for transmitting thrust between the driving box and frame. To provide full length flange contact between the housing and the frame the housing itself does not bear directly against the frame.

The housing casting includes a trunnion boss on the front and back sides in each pedestal. On these trun-

nions are mounted trunnion guides made of Timken steel, hardened and ground, which bear against the pedestal faces of the frame and carry the pedestal flanges which are finished with parallel sides. The trunnion bosses are 6 in. in diameter and extended out from the face of the housing 1½ in. Hardened and ground steel liners ¼ in. thick are welded to the pedestal faces of the housing and the bosses are fitted with ¼-in. hardened and ground steel bushings. The frame pedestals, which are parallel, are fitted with ⅜-in. channel-shaped hardened and ground steel liners.

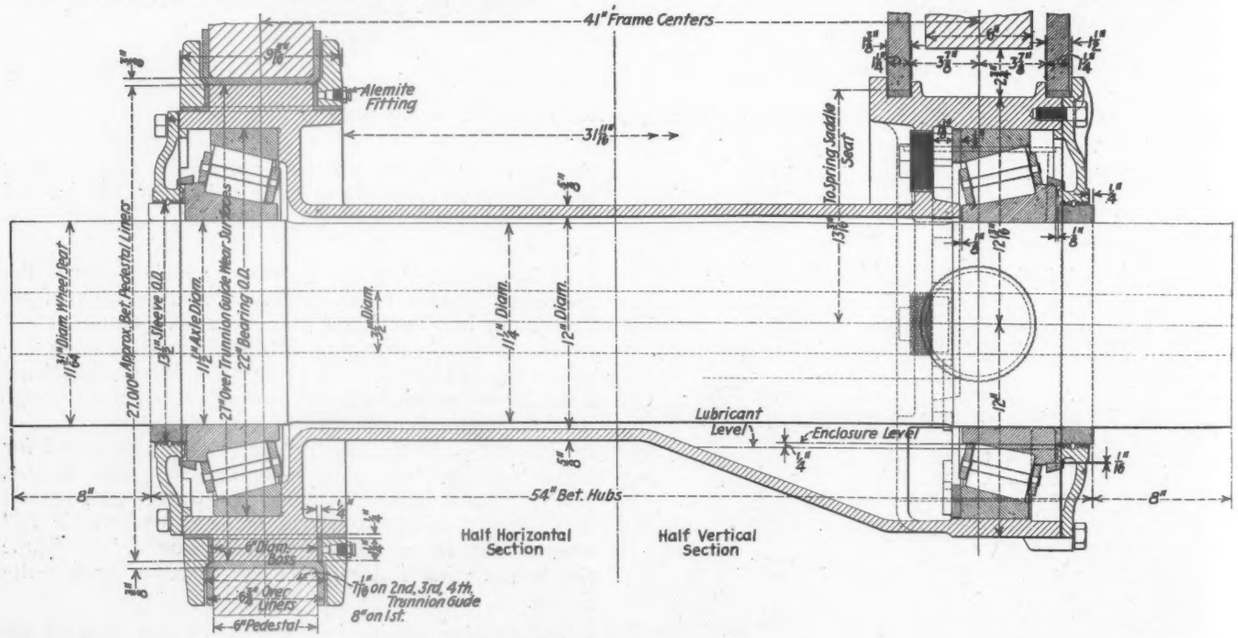
The width of the housings over the pedestal faces of the trunnion guides is 27 in. and the distance between the pedestal liners is about .01 in. greater. A lateral movement of the housing in the pedestals of 5/16 in. is provided for on all of the axles, except the first which is fitted with the Alco lateral motion device, and a controlled lateral movement of 1¼ in. is permitted on this axle.

The trunnion construction is experimental in its application to locomotive drivers, but past experience with this type of roller-bearing installation on engine trucks using the standard grade of steel casting, not hardened, indicates that the trunnion guides should give long ser-



General arrangement of the journal-box and bearing applied to the tender trucks

	Maximum, in.	Minimum, in.	Fit, in.
A—(Box)	9.875	9.873	.000 to .003 tight
B—(Cup)	9.876	9.875	
C—(Cone)	5.563	5.562	.003 to .005 tight
D—(Axle)	5.567	5.566	
E—(Cone)	7.5128	7.5118	
F—(Closure)	6.645	6.642	.015 to .020 loose
G—(Axle)	6.627	6.625	



Sections through the driving-axle assembly

vice. It is anticipated that they will not require attention between shopping periods of say 150,000 miles.

The application to the front axle of the Alco lateral motion device, as shown in one of the drawings, is an interesting feature in the design of the locomotive. The application is similar in many respects to that used with conventional driving boxes, except that the rollers of the resistance levers bear against the housing. The width of the housing requires a spread of 19½ in.

The rear trailing-truck box

center to center, between the rollers on each spring resistance lever.

The Engine and Trailing-Truck Bearings

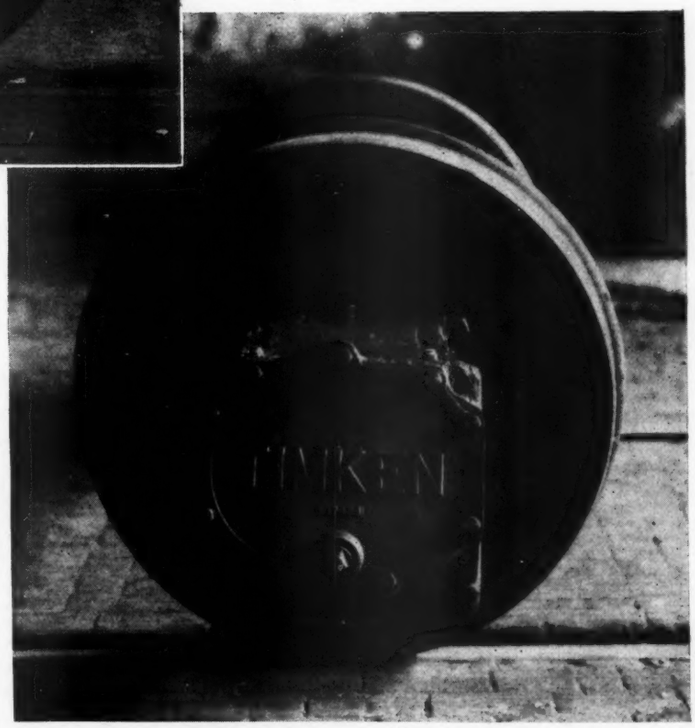
The engine truck shown in one of the illustrations, is of the same general design as that used on the 4-6-4 type locomotives of the New York Central. This design provides an integral housing which extends across the truck. Each bearing and housing assembly is designed to withstand every combination of thrust and radial load. Like the driving-axle bearings, there are no thrust plates on the housing or corresponding thrust hubs on the wheels.

Likewise, the trunnion guide construction is utilized between the bearing housing and the truck frame to provide full surface contact for the thrust and radial loads. Ordinary steel castings, machine finished, are used because of the absence of stresses set up by piston thrusts. At least a year's service between lubricating periods is expected from the bearings. This expectation is based on experience data which have been collected for several years. The roller-bearing construction also afforded the advantage of applying tender-type wheels with small symmetrical hubs, eliminating the necessity of carrying the special engine-truck wheels with large hubs.

Regular Timken double-bearing outboard bearings were applied to the journals of the trailing truck. These bearings are placed in the same pedestal openings as provided for plain bearings. The rear trailer bearing is also of the conventional roller-bearing design and takes the thrust reaction of the trailer truck. The front bearings do not take thrust reactions. They are provided with a self-centering lateral-motion device on rollers with 2¾ in. controlled lateral motion. This construction is of the same general type as the lateral motion used on engine trucks. This complies with the I. C. C. requirements, as the lateral motion between the bearing housing and the pedestal is not over 5/16 in.

Roller Bearings on the Booster

The crank shaft and idler gear of the Franklin booster are provided with Timken roller-bearings. The crank-shaft bearings are of the double-bearing construction, a double bearing being mounted on each end of the shaft. The idler bearing is of the Timken Quad type, which consists of four rows of medium size roller bearings designed for mounting as a unit in the housing. The size of these bearings was governed by the space limits on the idler gear and supporting mechanism. All of the journal boxes applied to the outside bearings are steel castings, containing about one per cent nickel.



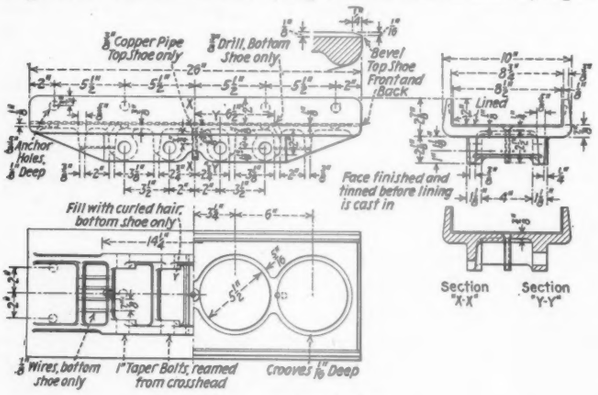
Application of the bearings to the front trailing-axles

Other Features of the Running Gear

The driving spring hangers are one-piece loop hangers, drop forged of carbon steel, in lieu of the usual double hangers, pin-connected to gib hangers above the frames. The wide opening between the pedestal jaws required driving springs of unusual length. These

springs are built with a back camber and are 50 in. long between centers.

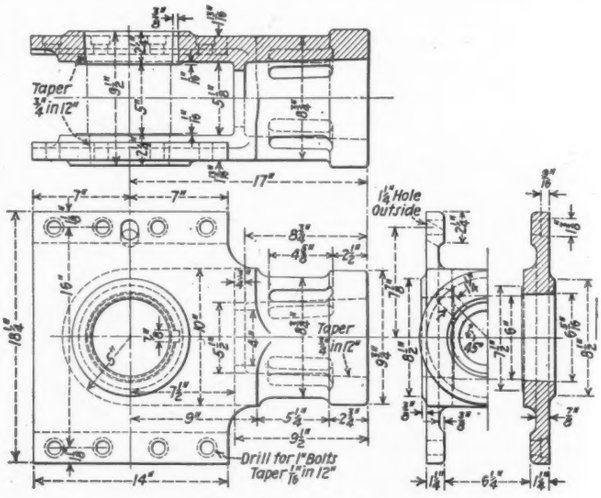
The guides, links and link blocks, as well as the material used in the construction of the roller bearings, are of Timken alloy steel, hardened and ground. The bearing steel contains about 4½ per cent nickel and 1½ per



The crosshead shoe

cent chromium. This steel composing the guides, links, link blocks and trunnion guides is especially resistant to abrasion and contains .30 per cent molybdenum and 2¾ per cent manganese. The crank pins and main and side rods are of carbon-vanadium steel, containing 2¾-per-cent nickel, normalized. The crossheads and shoes are of Univan steel, (nickel-vanadium alloy), heat-treated, which reduced the total weight of the component parts of each crosshead by 185 lb. The frames are also of Univan steel.

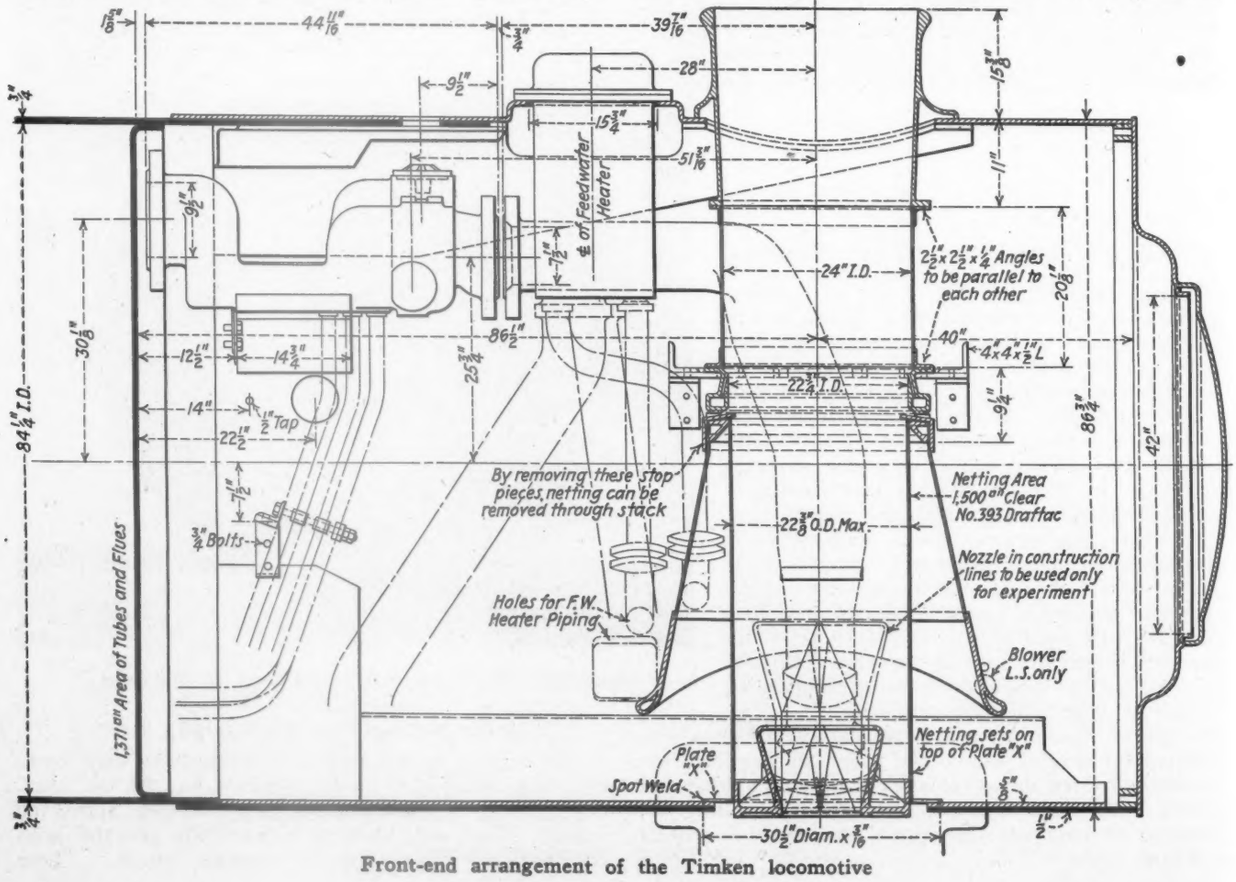
The reason for the selection of Timken special alloy steel for the guides is to reduce wear. The crossheads operate in an atmosphere carrying silica dust. This steel permits hardening and carburizing to a degree considerably harder than the silica. Thus, the possibility of the guides being cut or scored by sand and grit im-



The alligator crosshead

bedded in the babbitt lining of the cross head is reduced. This feature should also lessen the amount of wear on the crosshead shoes. The use of hard-steel guides is part of the plan to reduce wear and resulting hammering on the driver bearings.

The valve motion is designed to produce a maximum cut-off of 85 per cent. The reverse lever quadrant,



Front-end arrangement of the Timken locomotive

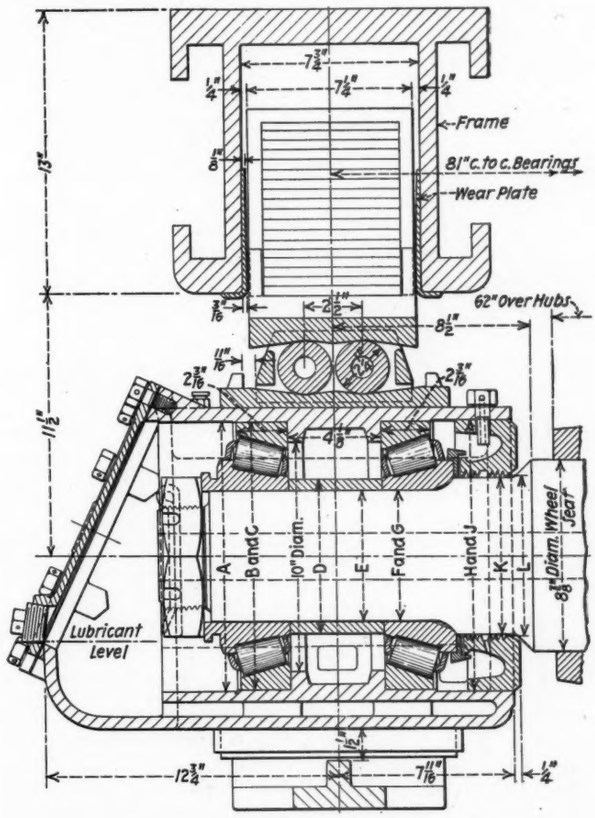
however, is provided with a spring stop which limits the cut-off to 70 per cent, unless the lever is held manually against the compressed spring. The Walschaert valve motion provides a maximum travel of 8½ in. for the 12-in. valves. The valves have a steam lap of 1½ in. and an exhaust clearance of ¼ in., and the valve motion provides a lead of ¼ in.

An interesting feature of the locomotive is the installation of over 1,300 Alemite fittings, of which 168 are on the roller-bearing units.

The shell of the boiler, wrapper sheet and firebox

List of Special Parts, Appliances and Equipment Applied on Timken 4-8-4 Type Locomotives

Owner	Timken Roller Bearing Co.
Builder	American Locomotive Company
Number built	One
Firebox and boiler:	
Arch tube, syphon, washout and smokebox inspection plugs	Huron Manufacturing Company
Blower fitting	Barco Manufacturing Company
Blower valve	Okadee
Blow-off cocks	Okadee
Boiler check valves	Consolidated Ashcroft Hancock Company
Boiler shell plates, butt straps, roof and side sheets	Otis nickel steel
Boiler plates, backhead, front tube sheet, dome, etc.	Otis carbon steel
Drifting valve	Ardco
Feed pipe strainer	Okadee
Feedwater heater, three-unit	Worthington
Feedwater-heater check valve	Consolidated Ashcroft Hancock Company
Firebox sheets—Crown, side and combustion chamber (in one piece) and syphons	Lukens nickel steel
Firebox sheets, others	Otis
Firebrick arch	American Arch Company
Firedoor	Franklin Butterfly No. 8
Flue cleaners	Rees Manufacturing Company
Front end hinge	Okadee
Grates	Firebar Corporation
Inspirator, non-lifting	Consolidated Ashcroft Hancock Company
Lagging	Ehret Magnesia Manufacturing Company
Low water alarms	Talmage Manufacturing Company
Pipe covering	Union Asbestos & Rubber Company
Safety valves	Coale Muffler & Safety Valve Company
Staybolts, flexible	Flannery Bolt Company
Stoker	Standard, Type B-K
Superheater, Type E	Superheater Company
Pyrometer	Superheater Company
Syphons	Locomotive Firebox Company
Tangential steam dryer	Superheater Company
Tank plates	Lukens Steel Company
Tubes and flues	Globe Steel Tubes Company
Water column	Nathan Manufacturing Company
Cylinders and running gear:	
Axles, driving, engine truck and trailer	Carbon-Vanadium steel, normalized
Booster	Franklin Railway Supply Company
Buffer, radial	Franklin Railway Supply Company
Crank pins, main	Nickel-Vanadium steel, normalized
Crank pins, other	Carbon-Vanadium steel, normalized
Crossheads	Union Steel Casting Company
Crosshead shoes	Union Steel Casting Company
Cylinder and valve bushings	Ni-Chrome iron
Cylinder cocks	Okadee
Drifting valve	Ardco
Driving tires and rear trailing truck tires of special heat-treated steel	Railway Steel Spring Company
Eccentric cranks	Union Steel Casting Company
Engine truck	Commonwealth
Frames, main engine, Univan steel	Union Steel Casting Company
Fulcrum block, adjustable equalizer	Townsend
Guides	Timken alloy steel, hardened
Lateral motion device for front trailer axle	Alco Timken roller type
Lateral motion on first drivers	Alco
Links and link blocks	Timken alloy steel, hardened
Packing, piston and valve stem	Paxton-Mitchell Company
Pistons and rings	Locomotive Finished Material Company
Reverse gear	Alco, Type G
Roller-bearing housings	Union Steel Casting Company
Rods, main and side	Nickel-steel, normalized
Sanders	Graham-White
Springs	Railway Steel Spring Company
Trailing truck	Commonwealth four-wheel Delta type
Wheels, truck and trailer	Carnegie
Cab:	
Air brake gage	Ashton
Back-pressure gage	Consolidated Ashcroft Hancock Company
Bell ringer	Viloco
Clear vision windows	Alco
Side wind shields	Prime Manufacturing Company
Coal sprinkler	Nathan Manufacturing Company
Cut-off control gage	Ashcroft
Lighting equipment	Pyle-National
Locomotive valve pilot	Cut-Off & Speed Recorder Corp.
Speed recorder	Weston Electrical Instrument Corporation
Steam gage, double dial	Ashton
Throttle	American multiple
Water-glass protector	Okadee three-view
Whistle operator	Viloco
Miscellaneous:	
Brakes	Westinghouse-American
Buffer beam	Commonwealth
Couplers and draft gear attachments	Gould Coupler Company
Draft gear	Waugh
Drawbar, engine and tender	Franklin Railway Supply Company
Flange oilers	Detroit four-feed
Flexible joints	Franklin Railway Supply Company

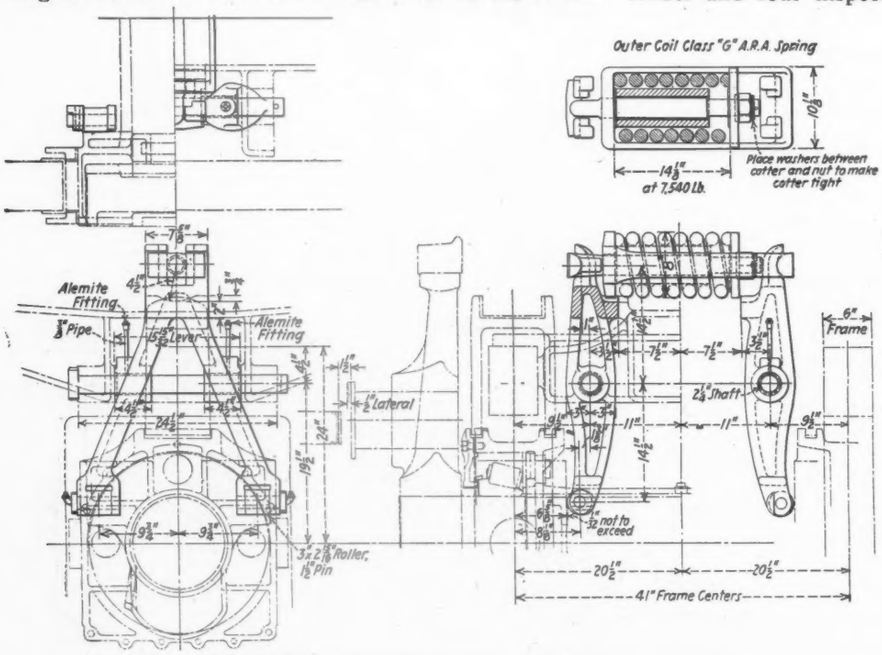


Front trailer-truck journal-box assembly

	Maximum, in.	Minimum, in.	Fit, in.
A—(Box)	11.772	11.767	
B—(Cup)	11.751	11.750	.001 to .004 tight
C—(Box)	11.749	11.747	
D—(Sleeve)	—	6¾ in.	—
E—(Sleeve)	5.762	5.759	.004 to .008 loose
F—(Axle)	5.755	5.754	
G—(Cone)	5.751	5.750	.003 to .005 tight
H—(Box)	11.770	11.767	.005 to .010 tight
J—(Closure)	11.777	11.775	
K—(Axle)	6.877	6.875	.015 to .020 loose
L—(Closure)	6.895	6.892	

Lubrication, grease	Alemite complete for engine and tender
Mechanical lubricator	Nathan 14 feed
Paint (lacquer)	E. I. du Pont de Nemours & Co., Inc.
Pipe fittings, copper	Parker Appliance Company
Pneuphonic horn	Westinghouse
Steam heat equipment	Vapor Car Heating Company
Steam heat coupler	Gold Car Heating & Lighting Company
Train control	General Railway Signal Company and Union Switch & Signal Company
Tender:	
Axles	Carbon-Vanadium steel, normalized
Clasp brake	American Steel Foundries
Springs	Railway Steel Spring Company
Tank plates	Lukens
Tender coupler	Symington Company
Tender hose coupler	Okadee
Tender trucks, Six-wheel, and tender water bottom frames	Commonwealth
Wheels	Carnegie

plates are of two per cent nickel steel. The main steam dome is equipped with a Tangential steam dryer manufactured by the Superheater Company. The water separated by this dryer is drained to a trap below the running boards in front of the throat sheet of the boiler.



Lateral-motion arrangement applied to the front axle

From the trap it is automatically drained to the ground.

The feature in the design of the boiler is the arrangement of the front end which follows Kiesel's Pennsylvania design. The netting, No. 393 Draftac, is built in the form of a cylinder, 22⅜ in. outside diameter, around the exhaust nozzle. This cylindrical netting arrangement extends up to the top of the draft-pipe extension of the stack. The nozzle has six radial openings which converge at the center. The smokebox is 86¾ in. in diameter. The stack proper has a minimum inside diameter of 24 in. tapering to 26 in. at the top, and extends down into the smokebox about 40 in.

A Standard BK type stoker feeds the coal to the firebox, which is equipped with three Nicholson thermic syphons, one of which is in the combustion chamber. The boiler is equipped with a Worthington 10,000-gal. three-unit feedwater heater and a Type E superheater. The firebox is designed for conversion to oil burning when required.

The Tender

The roller bearings on the journals of the tender are of the Timken Quad type similar to those applied to the idler on the booster. They are interchangeable in the truck frames with plain bearings. This bearing design, while relatively new in railroad service, has had over 200,000 miles in test service, over 100,000 miles in railroad operation and has been successfully operated under the tenders of heavy passenger engines.

The Commonwealth trucks are equipped with American Steel Foundries clasp brakes. The tender is equipped with a water scoop which has been designed to operate on both the New York Central and the Pennsylvania, the only two systems equipped with track tanks.

The locomotive is equipped with both the Union continuous train control and the General intermittent induction type. On each side of the locomotive under the running boards there are three inspection lights and an outlet receptacle for an extension cord. There is also an extension light in the stoker compartment in the tender and four inspection lights on each side of the tender.

On the top of the tender back of the coal space a cupola has been built for the use of the Timken representatives. It is equipped with steam heat, electric lights and two outlet plugs for electric appliances.

Both the engine and tender are finished in two-tone Duco.

Economies Expected from the Timken Locomotive

The operating economies expected from this locomotive are principally those believed to be possible from long continued operation with minimum repairs to the driver and other journal bearings. It is believed that the shopping periods will be limited in duration to conditions resulting from boiler operation.

The roller friction when starting is about one-twentieth that of the plain bearing, which indicates that 95 percent of the weight of the locomotive, or over 670,000 lb., can be added to the train without exceeding the permissible starting resistance of the locomotive and train. In addition, the weight on the drivers is subject to piston-thrust loads about four times that of the static weight.

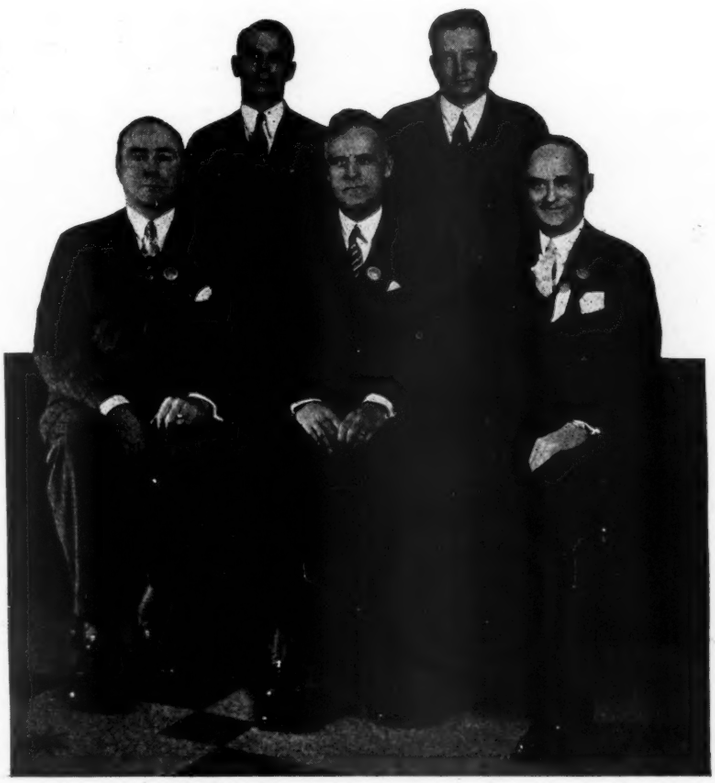
These features, it is estimated, should permit a locomotive equipped with roller bearings to start a train of 900,000 lb. greater weight than a locomotive having plain bearings and equal tractive force.

It is calculated that the rolling friction of the main bearings under heavy load will be reduced approximately one-half. This is based on tests on similarly loaded steel-mill bearings. The reduction in rolling friction on the other journals, including the tender, will vary from 5 to 15 per cent, being least at a speed of about 30 m.p.h. and higher at low speeds and at high speeds. This is due to the fact that the speed-friction curve for a roller bearing is a straight line from zero to maximum speeds. The curve for a plain friction bearing reaches its minimum at about 30 m.p.h. and then gradually increases at high speed due to inadequate maintenance of the film of oil at the higher operating speeds.

THE PONTCHARTRAIN RAILROAD, one of the shortest lines in America, celebrated its one hundredth anniversary on January 20. Unlike any other railroad in the nation, the Pontchartrain railroad still operates under the name which it was given when its original charter was issued. Eight trips daily are made by the railroad's one train, running between Pontchartrain Junction and Milneburg, a distance of 4.96 miles. Twelve trips on Sundays are made to and from Lake Pontchartrain by the train, which has come to be known as "Smoky Mary" and its engineer, conductor, flagman and fireman. The train crew members have entire charge of the movements of the single train, there being no trainmasters, dispatchers or signals, inasmuch as there is no danger of collision.

Fuel Association Work Commended by Railroad Officers

Chicago convention told that savings through fuel economy are largely offset by increased taxes



1930 officers, International Railway Fuel Association

Seated (left to right): Vice-president, W. G. Black, mechanical assistant to the president, Chesapeake & Ohio; president, W. J. Tapp, fuel supervisor, Denver & Rio Grande Western; vice-president, C. H. Dyson, fuel agent, Baltimore & Ohio.—Standing (left to right): Secretary-treasurer, C. T. Winkless, fuel agent, Chicago, Rock Island & Pacific; vice-president J. M. Nicholson, fuel conservation engineer, Atchison, Topeka & Santa Fe.

THE twenty-second annual meeting of the International Railway Fuel Association, held at the Hotel Sherman, Chicago, May 6 to 9, inclusive, was valuable from an instruction standpoint and in many respects, highly inspirational, in spite of a decrease in total registration from 2,364 in 1929 to 2,012 in 1930 and a 10-per cent decrease in the number of exhibitors. The usual active interest of this aggressive body of railroad officers was evident, however, in the discussion of committee reports and various vital fuel problems confronting the railroads. The exhibition of railway equipment and supplies, held under the auspices of the International Railway Supply Men's Association was an important adjunct of the convention from an educational point of view.

Following a brief introductory talk by President W. J. Tapp, fuel supervisor of the Denver & Rio Grande Western, J. S. Pyeatt, president of that road, commented on the effective work of the Association, and said that fuel performance is the best index of operating efficiency because practically every operating improvement is reflected in this index.

One important point emphasized in an address by Samuel O. Dunn, editor of Railway Age, was that, while the railroad fuel bill was being reduced from 1920 to 1928 by 47½ per cent, to $354,000,000, the railway tax bill was increased by 43 per cent, to $389,500,000, in the same period.

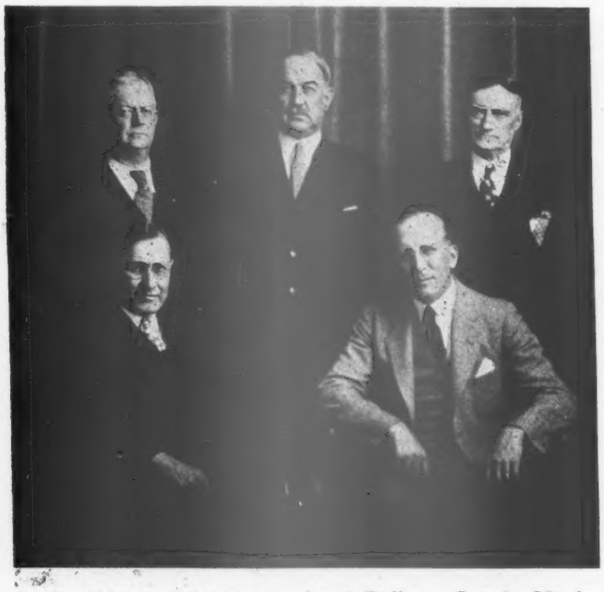
F. H. Hardin, assistant to the president of the New York Central, said that one of the evils of establishing startling records such as those achieved in fuel performance is the tendency to pat one's self on the back and accept that performance as satisfactory. He maintained that this is an economic age, featured by the survival of the fittest, and over 100 years' experience with the steam locomotive has shown that, by and large for all types of service, it has no equal.

One interesting suggestion by H. N. Rodenbaugh, vice-president of the Florida East Coast, was that powdered coal may present the solution to the railroads' problem of securing flexibility in operation and increased fuel economies, and that the International Railway Fuel Association would be well advised in investigating the possibilities of this type of fuel for locomotive service. [Owing to the enforced absence of Mr. Rodenbaugh, his address was read by F. S. Robbins, superintendent of motive power and machinery, Florida East Coast.]

In an able address, R. E. Woodruff, vice-president of the Erie, called attention to the well-known fact that fuel saving is not a one-man job and that railway men in all departments must work intelligently and enthusiastically together to secure the best results. He maintained that the job is only half done when railroad men learn how to save fuel and that the more difficult task of putting this knowledge into practical effect then confronts them.

D. L. Forsythe, general road foreman of equipment of the St. Louis-San Francisco, presented a paper on long locomotive runs, which was discussed at length. J. C. Nolan, fuel engineer of the Gulf Coast Lines, presented a comprehensive paper on Texas lignite. Com-

mittee reports were presented on the following subjects: Steam Turbine Locomotives, Chairman, L. P. Michael, chief mechanical engineer, Chicago & North Western, Chicago [In the unavoidable absence of Mr. Michael, this report was read by Edward Taylor, assistant engineer—transportation, General Electric Company, Chicago.]; Diesel Locomotives, Chairman, Clarence Roberts, assistant road foreman of engines, Pennsylvania, Philadelphia, Pa.; Front-Ends, Grates and Ash Pans, Chairman, Prof. Edward C. Schmidt, University of Illinois, Urbana, Ill.; New Locomotive Economy Devices, Chairman, E. A. Kuhn, engineer of motive power, New York, Chicago & St. Louis, Cleveland, Ohio; Coal-Firing Practice, Chairman, O. E. Wolden, fuel supervisor, Minneapolis, St. Paul & Sault Ste Marie, Minneapolis, Minn.; Oil-Firing Practice, Chairman, J. N. Clark, chief fuel supervisor, Southern Pacific, San Francisco, Cal.; Fuel Distribution and Statistics, Chairman, J. M. Nicholson, fuel conservation engineer, Atchison, Topeka & Santa Fe, Topeka, Kan.; Classification of Coal, Chairman, Malcolm Macfarlane, general fuel inspector, New York Central, New York; Storage of Coal and Oil, Chairman R. E. Rightmire, Consolidation Coal Company, Chicago; Fuel Stations, Chairman, W. T. Krausch, engineer of buildings, Chicago, Burlington & Quincy, Chicago; Coal and Oil-Fired Power Plants, Chairman, J. S. Morris, general foreman, New York, Chicago & St. Louis, Chicago. Abstracts of some of these reports will appear in this and subsequent issues of the *Railway Mechanical Engineer*.



1930 officers of the International Railway Supply Men's Association

Seated (left to right): Vice-president, S. A. Witt, Detroit Lubricator Company; president, C. O. Jenista, Barco Manufacturing Company.—Standing (left to right): Assistant secretary-treasurer, W. J. Dickinson, Duntley-Dickinson Supply Company, Chicago; treasurer, C. M. Hoffman, Dearborn Chemical Company, Chicago; chairman entertainment committee, J. W. Fogg, MacLean-Fogg Lock Nut Company.

Election of Officers

At the closing session, the railroad members of the International Railway Fuel Association elected the following officers for the ensuing year: President, C. H. Dyson, fuel agent, Baltimore & Ohio, Baltimore, Md.; vice-president, W. G. Black, mechanical assistant to the president, Chesapeake & Ohio, Cleveland, Ohio; vice-president, C. I. Evans, chief fuel supervisor, Missouri-Kansas-Texas, Parsons, Kan.; vice-president, J. M. Nicholson, fuel conservation engineer, Atchison, Topeka & Santa Fe, Topeka, Kan. Executive committee members (newly elected) are O. J. Brown, superintendent fuel service, Boston & Maine, Boston, Mass.; L. E. Dix, fuel supervisor, Texas & Pacific, Dallas, Tex.; F. X. Nachtmann, mining engineer, St. Louis-San Francisco, St. Louis, Mo., and Clarence Roberts, assistant road foreman of engines, Pennsylvania, Philadelphia, Pa. The hold-over members are J. D. Clark, chief fuel supervisor, Chesapeake & Ohio, Richmond, Va.; J. E. Davenport, assistant to assistant general manager, New York Central, Weehawken, N. J.; T. C. Hudson, general superintendent, Canadian National, Toronto, Ont.; J. R. Jackson, engineer of tests, Missouri Pacific, St. Louis, Mo.; M. Macfarlane, general fuel inspector, New York Central, New York, and A. B. Maurice, road foreman of engines, National Railways of Mexico.

New Locomotive Economy Devices

The report covering new locomotive economy devices, which has previously been confined entirely to direct fuel-saving devices, includes this year a presentation of practically any device that increases the efficiency of the locomotive, either directly or indirectly. This course was taken because there were no radical changes in various fuel-economy appliances during the past year.

The committee reported developments in high-pressure steam as applied to locomotive boilers, developments in increased tender capacity and developments made in perfecting a control valve for limiting the speed of feedwater pumps when the main throttle is closed, thus controlling the volume of relatively cold water which is pumped into the boiler when the locomotive is drifting or standing. Two such valves are now being developed to accomplish this purpose, one by the Worthington Pump & Machinery Corporation, and the other by the Southern Pacific. A report was also made on the use of boiler-check elbow extensions to reduce the possibility of cold water encountering firebox sheets, thus relieving strains caused by unequal temperatures at the top and bottom of the boiler. The upturned elbow extension is applied in the inner end of side boiler checks, the opening at the upper or delivery end being somewhat smaller than the size of the boiler check in order to produce a jet action.

Temperature Tests

In order to demonstrate the value of the upturned elbow, temperature tests were recently made on a heavy Mikado locomotive using the Worthington type *BL* feedwater heater. The engine was standing with no steam used, except that which runs the feedwater pump. The test was started with the water at the bottom of the glass and the pump was run until the glass was full. This took about six minutes. Thermometers were located about the crown sheet level, midway between the crown sheet and mudring, and about the fire line, all near the front of the fire box. The temperature of the tank water was 49 deg. F.

With the upturned elbow the temperature at the top of the boiler dropped from 384 to 359. The temperature at the middle and bottom thermometers dropped from 382 to 340. This resulted in a final difference in temperature between top and bottom of 19 deg. which is not enough to produce damaging strains through unequal expansion and contraction of the side sheets.

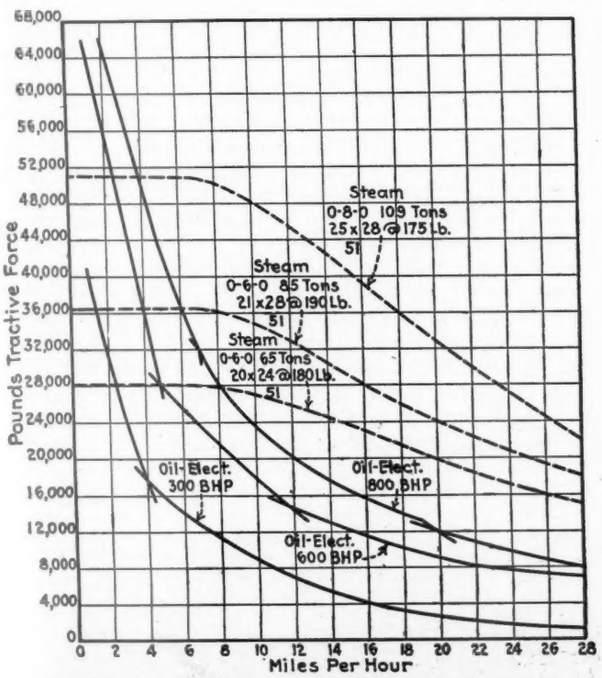
With the elbow removed the top temperature dropped from 384 to 374, the middle temperature from 383 to 319 and the bottom from 384 to 299. The top water cooled only 10 deg. while the bottom water cooled 85 deg., or a difference of 75 deg.

The committee also reported on the application of sludge removers, on the application of roller bearings to steam locomotives, on feedwater heaters and on the application of the locomotive water conditioner.*

The report also gave an account of back-pressure gage applications and what progress has been made in the locomotive valve pilot. The committee stated that since the publication of the last report, the valve pilot has made steady and consistent progress and that a test of this device showed a fuel saving of about 14 per cent on heavy freight power and about 18 per cent more work performed per pound of fuel burned.

Diesel Locomotives

The committee reported that the most interesting development abroad is represented by the German Diesel locomotive with air transmission, built by the Esslingen Locomotive Works, and now undergoing tests on the German State Railways. This is a 4-6-4 locomotive



Tractive force-speed characteristics of Ingersoll-Rand Diesel-electrics compared with steam locomotives

with a 1,200-hp. Diesel engine driving an air compressor, the compressed air being admitted to ordinary locomotive cylinders in the usual way. The cutoffs can be made as low as 15 per cent. The principal dimensions of this locomotive is shown in one of the tables.

The committee also reported on the Baldwin 0-4-4-0 type Diesel-electric locomotive 61000 built in May, 1929, in which has been installed a 1,000-hp. Krupp Diesel engine. The engine has oil-cooled pistons and heads. Jacket water and piston cooling oil are cooled in radiators by means of electrically driven fans. The engine is started by high-pressure air furnished by a compressor attached to the oil engine. This compressor also furnishes air for W. A. B. special No. 14 EL modified brake equipment. The principal characteristics and dimensions of this engine are shown in the table.

The performance of this locomotive has been compared with that of a consolidation steam locomotive weighing 251,000 lb. and having a tractive force of 49,000 lb. The hourly fuel and lubricant consumption was 9.4 gal. fuel oil and .2 gal. lubricant oil, respectively, during which time 21.1 cars were handled. The steam locomotive used 700 lb. of coal and .05 gal. lubricant oil per hour while handling 20.1 cars.

The committee reported that the Ingersoll-Rand Company is constructing for the Erie Railroad an oil-electric locomotive for switching service of a design radically different from any previously constructed by them. The power plant consists of one 825-b.hp., Ingersoll-Rand oil engine direct connected to a 525-kw generator. The latter furnished power to four G. E. 287 traction motors mounted on trucks.

Two 1,600-hp. oil-electric locomotives of new design, one for passenger, the other for freight and switching are about to be built also by the Ingersoll-Rand Company. The power plants are similar in each of these two locomotives, consisting of two 825-b.hp. Ingersoll-Rand oil engines in each locomotive, each engine direct connected to a 525-kw. generator. The generators furnish power to four G. E. 286 traction motors mounted on the trucks of the passenger locomotives while on the freight locomotive there are six G. E., Z-1748 traction motors mounted on the trucks. The graph shows the tractive-force-speed characteristics of the Ingersoll-Rand Diesel-electrics compared with steam locomotives.

The report included the results of comparative tests run at two industrial plants between a Westinghouse 600-hp. Diesel locomotive and a six-wheel switching locomotive weighing 180,000 lb. and having a tractive force of 36,000 lb. At one plant the total cost of operation per locomotive hour for the Diesel electric and steam locomotive was $3.6285 and $6.5212, respectively. At the other plant the cost of operation per locomotive hour for the Diesel locomotive was $5.085 and for the steam locomotive, $7.70.

Principal Dimensions of the German Diesel-Pneumatic Locomotive

Engine power	1,200 b.h.p.
Revolutions per minute	450
Working air pressure	100 lb. per sq. in.
Tractive force at rail	25,000 lb.
Number of cylinders of Diesel engine	6
Diameter of Diesel cylinders	17 11/16 in.
Stroke of Diesel cylinders	16 1/2 in.
Diameter of compressor cylinders	25 in.
Stroke of compressor cylinders	13 3/4 in.
Diameter of locomotive cylinders	28 in.
Stroke of locomotive cylinders	25 5/8 in.
Diameter of driving wheels	63 in.
Speed limit	50 m.p.h.

The report concluded with a partial bibliography of books, papers, and articles on Diesel locomotives published by the technical press.

Discussion

L. G. Coleman, Ingersoll-Rand Company, in discussing the report, said that he anticipated that a Diesel-electric locomotive design would be developed and prove satisfactory for road service in competition with steam locomotives. In commenting on the unit weight of Diesel-electric equipment, he said that the minimum was now about 200 lb. per hp., and took exception to the statement of Mr. Hardin that the New York Central

* A description of the locomotive water conditioner was published in the March, 1930, issue of the Railway Mechanical Engineer, page 165.

Hudson-type locomotive developed 1 hp. for each 84 lb., on the ground that the weight of the tender in operating condition was not included in arriving at this figure. With regard to the first cost, Mr. Coleman also pointed out that, in view of the higher availability for service of Diesel electric equipment, the first cost is not such a limiting factor as at first appears.

Principal Characteristics and Dimensions of the Baldwin Oil-Electric Locomotive No. 61,000

Gage	4 ft. 8½ in.
Diesel engine—Cylinders, number	6
Cylinders, diam. x stroke	15 in. x 15 in.
Cylinder, type 4 cycle, solid injection, supercharged	
Nominal horsepower	1,000
Electric motors—Number	4
Type	Westinghouse No. 355
Voltage	600
Electric main generator, type	Westinghouse 478-A
Driving wheels, diameter	48 in.
Journals	8½ in. by 15 in.
Wheel base, rigid	10 ft. 6 in.
Wheel base total	35 ft. 6 in.
Length from center to center of couplers	51 ft. 0 in.
Length over cab	44 ft. 0 in.
Height, over all	15 ft. 8¾ in.
Width, over all	10 ft. 6 in.
Capacity of fuel tanks	800 U. S. Gal.
Weight on driving wheels	270,000 lb.
Weight total engine	270,000 lb.
Starting tractive effort, maximum	67,500 lb.

S. G. Childs, Baldwin Locomotive Works, mentioned the satisfactory performance of Baldwin Diesel-electric Locomotive 61000 and agreed in the main that what is needed for road service is higher sustained horsepower at speeds. Other discussion indicated that the future for Diesel-electric locomotives is reasonably assured in conjunction with electric operation on two scores at least; namely, for industrial switching in and near towns where high tension electric overhead wires or third rails are not permissible; also as reserve power for use on electrified sections for moving wreck trains in case of power-line failures.

Front-Ends, Grates and Ashpans

Of the various subjects considered during the year by the standing Committee on Front-ends, Grates and Ashpans, it has concluded to present in its report only two: namely, (1) Present practice with respect to the retention or elimination of superheater dampers, and (2) The use of standing tests of locomotives as a means of studying draft appliances and front-end performance.

Elimination of Superheater Dampers

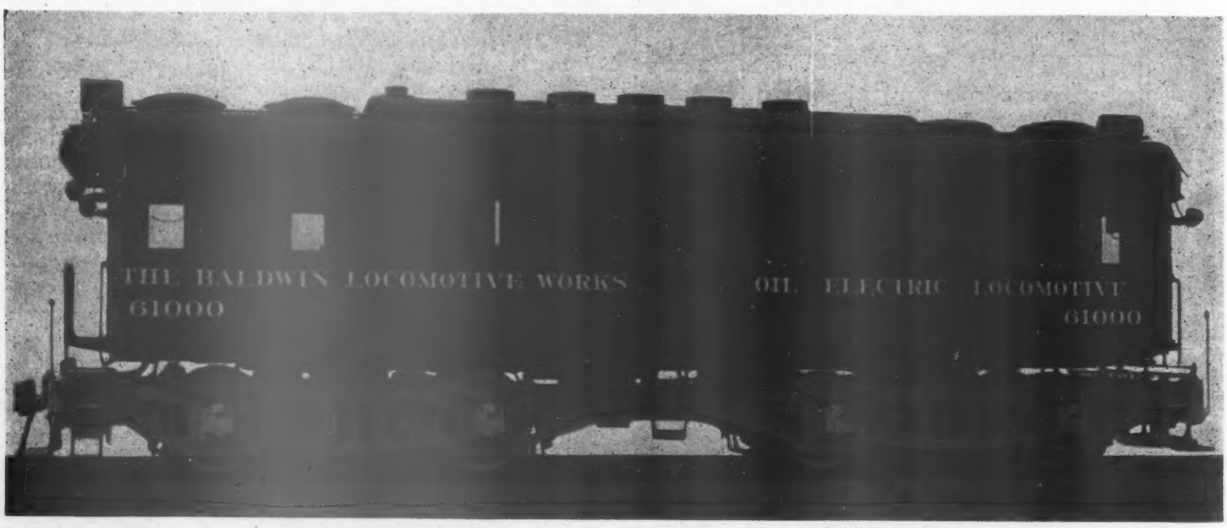
Although for several years certain roads have operated locomotives without superheater dampers, the committee has been impressed with the continued difference of opinion as to the advisability of this practice, and it has therefore seemed desirable to collect and present to the association information concerning current practice with respect to the elimination or retention of dampers.

An inquiry was accordingly sent to 69 of the larger railroads of Canada and the United States, and 64 roads in reply thereto have given the main facts about their practice. The only large companies not replying were the Rock Island and the Southern. The main purpose of the inquiry was to determine to what extent the use of superheater dampers has been abandoned or is being abandoned, and to learn the reasons for their elimination. The roads replying to the inquiry have in service 54,726 locomotives, or about 85 per cent of the total number in service in the two countries. These locomotives are classified as follows: Road locomotives burning coal, 38,972; road locomotives burning oil, 5,229; yard locomotives burning coal, 9,504; yard locomotives burning oil, 1,021.

Of these 54,726 locomotives 41,284 (75 per cent) are equipped with superheaters whose distribution is shown in one of the tables.

The main facts concerning damper removal are presented in a table. The reports furnished by 64 railroads make it clear that under the removal policies now in force on 32 roads, superheater dampers have been removed or are in process of being removed from about 56 per cent of the 36,812 Type A superheater locomotives now in service on the reporting roads; that is, dampers will soon have been removed from nearly 21,000 of these locomotives.

Other Types of Superheaters.—Four of the roads replying to our inquiry report in service 2,233 superheaters of other than the A or E types above discussed. The Canadian Pacific has in service 1,253 locomotives equipped with Vaughan-Horsey superheaters, from which the dampers have been removed. The Canadian National have in service 434 "other types" of superheaters which, although not specifically so designated,



The Baldwin oil-electric locomotive No. 61,000

the committee has assumed to be the Vaughan-Horsey type. This system's general policy of retaining dampers applies to these superheaters. The Chicago, Burlington & Quincy has 546 Emerson superheaters in service. If these superheaters were originally equipped with dampers, the dampers have been removed under the general removal policy of this road.

Standing Tests Offer Practical Means For Studying Draft Appliances

A standing test of a locomotive is one in which the engine machinery is disconnected and the boiler alone is operated, the steam generated being passed (either wholly or in part) through the regular exhaust nozzle to produce draft in the usual way. Such tests have long been used to study general boiler performance, and their simplicity and low cost as compared with road tests commend their use. Their use for the study of draft appliances and front-end performance is relatively recent, although the advantages flowing from their simplicity are in no connection more marked than in front-end-tests. The Committee on Front-Ends, Grates and Ashpans has thought it timely to include in its report a discussion of such tests and it therefore asked George W. Armstrong, a member of the committee who has had extensive experience in conducting standing tests, to prepare such a discussion.

[Mr. Armstrong's discussion of front-end tests will appear at length in a later issue.—EDITOR.]

The report was signed by Professor Edward C. Schmidt, University of Illinois, chairman; George W. Armstrong, Bethlehem Steel Company; W. R. Beasom, Pennsylvania; H. A. Boyer, Erie; J. S. Breyer, Southern; E. C. Fogh, National Air Control Company; V. L. Jones, consulting mechanical engineer; G. H. Likert, U. P.; J. L. Ryan, St. L.-S. F.; L. W. Withrow, C. & O.; E. G. Young, University of Illinois, and F. Zeleny, C. B. & O.

Distribution of Superheaters by Types

Number of Superheaters in Service	The Superheater Company's Type A	The Superheater Company's Type E	Emerson and Vaughan-Horsey superheaters
On road locomotives burning coal	27,611	2,091	2,008
On road locomotives burning oil	4,033	148	
On yard locomotives burning coal	4,618	....	225
On yard locomotives burning oil	550	....	
Totals	36,812	2,239	2,233
Grand Total			41,284

Summary of the Policies of Sixty-four Railroads with Respect to the Removal of Dampers from Locomotives Equipped with Type A Superheaters

Group no.	Damper removal policy	Number of roads in group	Number of locomotives equipped with Type A superheaters in service on these roads	Percentage of locomotives equipped with Type A superheaters
I	Retaining All Dampers	24	9,465	25.7
II	Removing All Dampers	25	20,146	54.7
III	Removing Dampers from Certain Kinds of Engines, or in Certain Types of Service	7	2,925	8.0
IV	Policy Not Yet Defined	8	4,276	11.6
	Totals	64	36,812	100.0

Discussion

P. E. Bast, fuel engineer, Delaware & Hudson, said that the Wooten firebox locomotives on the D. & H. were all of the Consolidation type and the throat sheets so shallow that it was impossible on most to apply a brick arch. Consequently the gas temperature at the back ends of the flues was so high they had found it impossible to eliminate dampers.

G. H. Likert, fuel engineer, Union Pacific, outlined tests run on his road for a period of years, with dampers eliminated, and, as a result of that experience, the Union Pacific has since removed all dampers.

W. G. Black, mechanical assistant to the president, Chesapeake & Ohio, said that on some locomotives, when the damper is removed, an increase in superheated steam temperature can be observed.

W. A. Buckbee, Superheater Company, outlined the experience of his company and stated that their conclusion was that dampers could not be removed without trouble being experienced when cast-iron return bends are used. With the forged return bends they have not observed any detrimental effect.

Dynamometer Car vs. Standing Tests

D. J. Sheehan, special engineer, Chesapeake & Ohio, described the value of the dynamometer car in studying road operation and developing drawbar pull characteristics of the locomotive. He mentioned the increased tendency of using standing tests for valuable study of boiler characteristics, but emphasized the limitations of standing tests which do not take into consideration the rapid and frequent changes encountered in road service.

N. L. Wiggin, chief fuel supervisor, the Boston & Maine, outlined his observations as to the value of the standing tests made on that road with a K-8-C locomotive in nozzle and front end studies. He emphasized the close agreement of standing tests with observed road results. The value of a dynamometer car in developing locomotive drawbar-pull-speed curves and in checking tonnage ratings was mentioned by Mr. Wiggin, but he said that, owing to the inability to maintain constant working conditions for any length of time, the dynamometer car test results include many variables and are proportionally hard to interpret. Mr. Wiggin added that if the dynamometer car shows that the drawbar-pull-speed characteristics are not what should be expected, because of boiler limitations, the standing test can be used to determine what changes are necessary. The consensus of this part of the discussion was that the use of a dynamometer car, supplemented by standing tests for boiler characteristic studies, will permit a railroad to develop the maximum in fuel economy and performance from its locomotives.

C. A. Seley, consulting engineer, contributed an abstract of a paper to be presented by H. N. Gresley, chief mechanical engineer, London & North Eastern, at the coming International Railway Congress, outlining a method developed for integrating smokebox draft.

H. Morris, superintendent of fuel and locomotive performance, Jersey Central, described the benefits derived by his road in developing feedwater-heater value through standing tests and the use of these results in conjunction with water figures taken over the division in actual service between points where locomotive operating requirements changed markedly. The coal consumption was calculated for the respective water rates, and a coal-burning curve developed as a total divisional consumption, which checked closely with actual observed fuel charge-outs. The information thus developed by standing tests and their tie-in with road operation enabled him to arrive at a comparison of benefits derived from feedwater heater use, in conjunction with varying operating conditions, which was interesting and instructive and would have been incapable of development otherwise.

Modernizing a Car Repair Shop

(*Continued from page 311*)

The inspection party proceeded through the power plant, the storehouse, the ready track and finally to the enginehouse. Everything seemed to be satisfactory, engines were clean, repairs apparently well made and the locomotives appeared to be well cared for. The enginehouse, just recently completed, made an excellent showing and little if any criticism was offered. The master car builder led the party toward the car yard and car shop. The yards were in order and presented a good appearance, also the cars were spotted on the light repair tracks in an orderly manner and very little comment was made.

Upon arrival in the car shops the president appeared greatly interested in the straight line system of car repairs and asked various questions of the master car builder relating to the different classes of cars which had been segregated on certain tracks and were being worked by the same unit of men. It was explained that increased efficiency was obtained by having certain carmen specialize on repairs to one class of equipment for the reason that they became familiar with the manner in which the repairs were made and often devised better methods of performing the work with less effort on their part. It was further explained that the progressive system of repairs provided that cars must move from each spot daily in order that the men stationed at that particular spot would not be required to move their tools and equipment at any time but rather the cars would be moved to them for repairs.

Having had all of his questions answered in a satisfactory manner, the president expressed a desire to meet the general foreman who was responsible for the excellent performance of the Ridge Point car shop. The president asked Carson a number of questions relating to the details of the work and questioned him very carefully as to the possibility of improving operations. Finally he asked Carson bluntly, "What would be needed to increase the output of this shop at least 50 per cent?" Carson replied briefly but to the point, "A complete new shop. The present force, with the proper facilities, could do a much better job than even an increased force could do here with these facilities."

"Have you any idea of what kind of a layout would meet the requirements at this point?" asked the president. Carson replied in the affirmative and added that he would be glad to furnish the master car builder with his recommendations on very short notice.

* * * * * * * * * *

After several weeks a personal letter from the master car builder was in Carson's mail one morning. Part of it read as follows: "The management has acted favorably on the suggestion made some time ago concerning new-car repair facilities at Ridge Point shops. You are authorized to prepare a standard estimate, calling on the division engineer for assistance in its preparation, and submit the completed estimate to this office without undue delay."

Carson's preliminary work enabled him to complete the job in short order and at the time this story is written the new car shops have been built and are in operation, turning out 80 cars a week with a very slight increase in force over that employed at the old shops. Preliminary cost figures on the operation of the new shops indicate a saving of approximately 16 per cent on the investment in the new facilities. Most important has been the effect on the morale of the organization—the decreased labor turnover has been the most noticeable change that has taken place.

Effect of Modern Facilities on Terminal Operation

(*Continued from page 306*)

are fired up in the house, is a motor-driven blower which fits over the stack of the locomotive, under the smokejack.

With this blower locomotives may be drafted in from less than three-quarters of an hour to an hour and a quarter, depending on the speed at which the motor is operated. At the higher speed the operation has been found to consume about 2½ kw. hrs., at a cost of about five cents. At the lower speed the total power consumption and the cost are considerably less. At terminals with poorly equipped boiler plants material savings in the cost of drafting locomotives have thus been effected.

One of the most interesting trends in the attitude of mechanical officers toward engine-terminal equipment is that relating to machine tools. It was not so many years ago that the enginehouse machine shop was considered to be the natural dumping ground for machine tools that had outlived their usefulness in the back shop. The steadily increasing importance of running-repair work has prompted many mechanical officers to specify new and high grade machinery for the enginehouse and to locate such machines in a well-lighted shop separated from the roundhouse proper in a manner such that the machines will not be subjected to the corrosive action of the house gases.

Table IV—A Cinder-Pit Comparison

NEW TYPE CINDER PIT

	Monthly cost of operation	Cost new
(Overhead travelling crane with deep water pit)....		$27,550.00
3 cinder pit men 8 hr. daily at .49 an hour..... (42 engines daily save 15 to 20 min. when dumping ash pans and cleaning fires)	$352.80	
Repairs	5.00	
Interest and Depreciation	229.00	
Electricity used	3.60	
Crane operator (Coal dock man 1 hr. daily)	.....	
Cost per engine despatched—46 cents.	$590.40	

OLD TYPE CINDER PIT

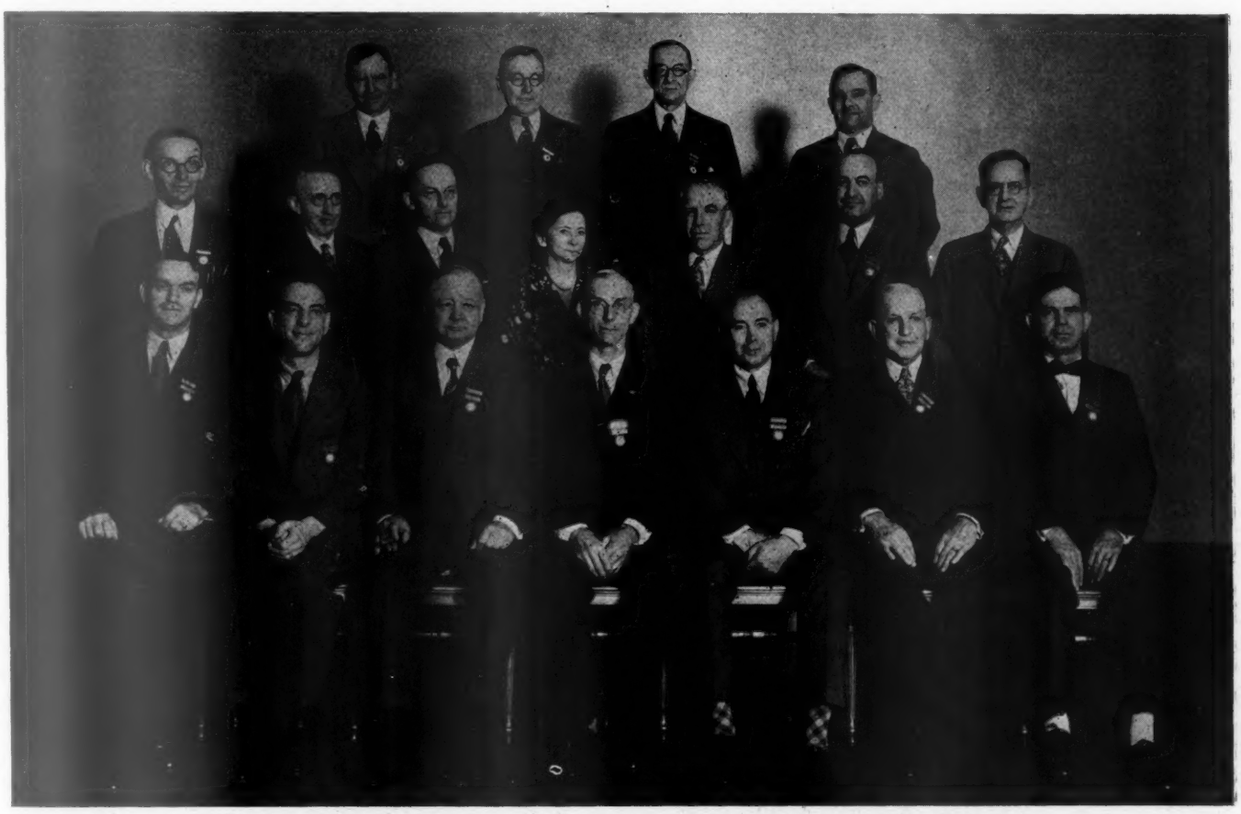
	Monthly cost of operation	Cost new
This consisted of an overhead monorail with an air-operated hoist and buckets. The pit was of concrete. For large locomotives it was necessary to move an engine off the pit while the bucket was being hoisted and dumped		$4,500.00
3 cinder pit men 12 hr. daily at 49 cents an hour...	$529.20	
2 hostlers, 8 hr. daily at 71 cents an hour.....	340.80	
Repairs	25.00	
Interest and depreciation	37.50	
Air used	50.00	
(Operated by cinder pit men)	.....	
	$982.50	

Cost per locomotive despatched—78 cents.
Savings, new cinder pit over the old
Per locomotive despatched—32 cents
The saving per month in total operating costs—$392.10—or $4,705.20 a year, which represents 17 per cent on the investment.

Thirty-Seventh Air Brake Convention

Papers on passenger-train handling and training employees feature instructive program

AIR brake supervisors, engineers and others concerned in the development, operation and maintenance of air brake equipment met at the thirty-seventh annual convention of the Air Brake Association, which was held in the Hotel Stevens, Chicago, May 13 to 16, 1930, inclusive. The total registered attendance was 689. The Air Brake Appliance Association held its customary exhibit during the convention with 46 manufacturers having products or descriptive literature on display.



Officers for 1929-1930 and Some of the Past-presidents of the Air Brake Association

Front row, left to right: C. H. Rawlings (D. & R. G. W.), executive committee member; W. F. Peck (B. & O.), second vice-president; T. L. Burton (N. Y. C.), secretary; W. W. White (Mich. Cent.), president; W. H. Clegg (Can. Nat.), first vice-president; R. M. Long (P. & L. E.), second vice-president; E. Z. Mann (A. C. L.), executive committee member.—Second row, left to right: J. A. Burke (A. T. & S. F.), executive committee member; Mark Purcell (N. P.), president, 1923; E. Von Bergen (I. C.), executive committee member; Florence Wicklin, convention reporter; Geo. H. Wood (A. T. & S. F.), president, 1924; J. P. Stewart (M. P.), executive committee member; C. C. Farmer (W. A. B. Co.), president, 1894.—Back row, left to right: John Hume (W. A. B. Co.), president, 1905; P. J. Langan (D. L. & W.), president, 1909; T. W. Dow (Erie), president, 1917; F. J. Barry (N. Y. O. & W.), president, 1919.

The program consisted of the opening address by S. O. Dunn, editor, Railway Age, the presidential address by President W. W. White, supervisor of air brakes, Michigan Central, seven papers and three committee reports. Five of the papers were prepared by committees from local air-brake clubs. The South Eastern Air Brake Club presented a paper on The Care of the UC and Triple Valve While Out of Service, and a paper on Operation of the Air-Pressure Water System on Sleeping and Passenger Cars was presented by the Central Air Brake Club. Papers on Brake Equipment for Gas-Rail Cars and Triple Valve Repairs—Maintaining Standards were presented by the Pittsburgh and the North West Air Brake Clubs, respectively. The Manhattan Air Brake Club presented a paper on the "U-12-BC Universal Valve." Geo. H. Wood, supervisor of air brakes, A. T. & S. F., and chairman of the A.R.A. Committee on Brakes and Brake Equipment, presented a brief paper in which he discussed the relations of the work of his committee to that of the Air Brake Association. The second individual paper was on Passenger-Train Handling Instructions, by J. A. Burke, assistant

supervisor of air brakes, A. T. & S. F. The three committee reports were on recommended practice, training and supervision of employees having to do with the maintenance of brake equipment, and brake system leakage.

The Air Brake Appliance Association arranged a program of entertainment which included an old-time minstrel show on the first evening of the convention. This show was sponsored by the Supervisors' Association of the Corwith, Ill., reclamation plant of the Atchison, Topeka & Santa Fe. The annual grand ball was held Wednesday evening, May 14.

Election of Officers and Other Business

The Air Brake Association closed its convention with the election of the following officers: President, W. H. Clegg, chief inspector of air brakes and car heating equipment, Canadian National; first vice-president, R. M. Long, supervisor of air brakes, Pittsburgh & Lake Erie; second vice-president, W. F. Peck, supervisor of air brakes, Baltimore & Ohio, and third vice-president, C. H. Rawlings, general air brake instructor, Denver & Rio Grande Western. T. L. Burton, air brake engineer, New York Central, was re-elected secretary, and Otto Best, Nathan Manufacturing Company, was continued in office as treasurer.

The following were re-elected to the Executive Committee: E. Z. Mann, general mechanical instructor, Atlantic Coast Line; E. Von Bergen, general air brake, lubrication and car heating engineer, Illinois Central; J. E. Gardiner, general air brake inspector, Boston & Maine, and J. P. Stewart, general supervisor of air brakes, Missouri Pacific. J. A. Burke, assistant supervisor of air brakes, Atchison Topeka & Santa Fe, was elected to fill the vacancy on the Executive Committee created by the election of Mr. Rawlings to third vice-president.

The annual meeting of the Air Brake Appliance Association was held Thursday afternoon, May 15, at which the following officers were elected: President, A. S. Lewis, Barco Manufacturing Company; first vice-president, H. A. Flynn, New York Air Brake Company, and second vice-president, E. H. Weaver, Westinghouse Air Brake Company. F. W. Venton, Crane Company, was re-elected secretary and treasurer. The following were elected to the Executive Committee of the Appliance Association: Thomas O'Leary Johns-Manville Corporation; S. A. Witt, Detroit Lubricator Company; J. W. Fogg, McLean-Fogg Lock Nut Company; J. A. Galligan, Superior Railway Equipment Company, and E. G. Busse, Chicago Railway Equipment Company.

Officers and committee chairmen of the Air Brake Appliance Association

Front row, left to right: H. A. Flynn (New York Air Brake Co.), second vice-president; A. S. Lewis (Barco Mfg. Co.), first vice-president; R. F. Duysters (Simmons-Boardman Pub. Co.), president; E. H. Weaver (Westinghouse Air Brake Co.), chairman, entertainment committee.—Back row, left to right: J. K. Aimer (Reading Iron Co.), chairman, registration committee; F. W. Venton (Crane Co.), secretary and treasurer; Thomas O'Leary (Johns-Manville Corp.), vice-chairman, registration committee.

It was decided to hold the convention at Toronto, Ont., in 1931, if the necessary hotel accommodations could be arranged.

Following is a summary report of the addresses, papers and committee reports presented during the convention.

New Forms of Competition

In introducing his remarks, Mr. Dunn stated that it is a curious fact that the revolution in transportation, which began a century ago, involved the substitution of railways for highways and waterways as our principal means of transport, while the most outstanding feature of the revolution through which we are now passing is the diversion of traffic from the railways back to the highways and attempts to divert it back to waterways.

Mr. Dunn briefly reviewed the developments in steam railroad competition, emphasizing that of subsidized waterways, and the fact that although the railroads contribute as taxpayers to the support of such competition, nevertheless they are not permitted to participate in any of its advantages. Railway freight business, he said, has continued to show increases but its rate of growth is much slower than before the war, and owing to this and to the large decline of passenger business, total railway earnings are tending to decline. Last year, he said, in spite of a record-breaking freight business, total earnings were less than in either 1926 or 1923. This, he pointed out, was the first year in railroad history when total earnings failed to set a new high mark in a year of great business activity. During the business depression in the first quarter of this year, Mr. Dunn said, the total railway earnings were the smallest since 1922. Formerly the railroads derived almost one-fourth of their earnings from passengers. Now, he said, with all the great passenger terminals they have, and all the fast and luxurious trains they are running, they are deriving only about one-seventh of their earnings from passengers.

Taking fuel consumption as a specific example, Mr. Dunn pointed out that between 1920 and 1928 while the fuel bill was being reduced 47½ per cent, the tax bill was in process of being increased 43 per cent. Of course, he said, the reduction of the railway fuel bill has not been due entirely to increased efficiency in the use of fuel because there have been reductions since 1920 in prices of fuel. Nevertheless, Mr. Dunn pointed out, the amount of fuel consumed by locomotives in 1929 was approximately 40,000,000 tons less than it would have been if the efficiency with which it was used had been the same as that in 1920.

Mr. Dunn concluded his address by pointing out the improved attitude of the public toward the railroads, and stated that, although the situation might appear rather pessimistic at the present time, there was every reason to expect an improvement in the future, considering the railroad industry as a whole.

Address by President White

W. W. White, supervisor of air brakes, Michigan Central, and president of the Air Brake Association, in his presidential address, stressed the need for further effort toward improving the operation and maintenance of air brakes on both freight and passenger equipment. He spoke of the possibility of improved operation if all dirt and foreign matter could be excluded from the brake system. Although there were a number of protective devices now available for such devices as brake cylinders, it is apparent, he said, that a more effective protective device should be perfected for the triple valve. He suggested that many roads could accomplish much by the use of triple-valve condenming gages. Many air brake departments, he said, had been affected by the program of economy which various railroads had been required to adopt. In this program, the air-brake supervisor could play an important part. Over 22 millions of dollars, he said, were spent for air brake equipment and materials during 1928. Mr. White closed his remarks by emphasizing the value of the printed proceedings of the association to the air brake man. The value of these proceedings, he said, is considerably enhanced by having complete discussions on each paper and report.

Care of UC and Triple Valves

The South Eastern Air Brake Club presented a paper on the care of UC and triple valves while out of service. This paper covered such items as valve crating and shipping, valve storage conditions, valve cleaning, valve repairs and valve testing. The paper stressed the need of proper instruction in the crating and shipping of air brake valves and storing them in a dry, clean place. It recommended the use of steam for removing the dirt and accumulation from the outer portions of the valve but under no circumstances should the steam jet be directed into the ports and passages of the valve. The various parts inside the valve should be dismantled and cleaned at the first handling. Care should be taken to see that the dismantled parts are protected from dirt and the air blast until after they are assembled in the valve.

The paper condemned the center-punching of graduating valves as bad practice. This practice, according to the paper, is one freely indulged in by air brake repairmen who use the center-punch marks as a guide to reassemble the valve, and could be overcome by proper instruction. A real contribution to the better care of the triple valve, the paper pointed out, was to see that the workmen have special tools for special jobs and that they are reasonably skillful in their use.

The ensuing discussion suggested that air-brake valves are well protected during shipment, but that dirt gets into the valves during the process of unpacking and application. Several speakers also referred to the tendency for dirt to get into the various valves of the air-brake system during the process of sand blasting freight cars on coming out of the repair shop.

The A.R.A. Committee on Brakes and the Air Brake Association

In reviewing the relationship of the work of the Air Brake Association to the A.R.A. Committee on Brakes and Brake Equipment, Geo. H. Wood reviewed the developments of this relationship from the time that the former Master Car Builders' Association invited the Air Brake Association to appoint a special committee to meet with it and participate in the discussion of air-brake subjects. This relationship has continued and developed to its present form.

Mr. Wood pointed out that through the Air Brake Association many practices and methods have been developed which are of mutual advantage to all the railroads. Many such methods and practices, once thoroughly established, have been incorporated in the standard and recommended practices of the A.R.A. Various proposals, he said, reach the A.R.A. committee through the regular channels, and the fact that many of the committee members are also members of the Air Brake Association enables them to be fully conversant with the subjects presented and the facts relating thereto. The Committee on Brakes and Brake Equipment, he em-

phasized, has essentially legislative functions. Its action, when approved by ballot, becomes a law of the A.R.A. in the interchange of equipment. It is, therefore, its duty to consider carefully and to investigate thoroughly all subjects presented so that one railroad will not benefit at the expense or hardship of another and so that the greatest good will accrue to the greatest number of member railroads.

Air-Pressure Water System on Sleeping and Passenger Cars

Operation of the air-pressure water system on sleeping and passenger cars was the subject of the paper presented by the Central Air Brake Club, the purpose of which was to explain the operation and maintenance of the water-raising system. This paper included a considerable number of detail drawings of the equipment, one of which showed the details of a test rack for testing the reducing valve and governor valve, and also a method for testing the governor for back leaks. In addition, the paper set forth a series of tests to be made by mechanics in case of failure of the water system; special instructions for train crews in case of a complete failure while the car is enroute, and the principal features to be looked after to insure the proper operation of the water-pressure system.

Attempts are now being made to simplify the present installation of the water-pressure system which has been standard for several years, by the elimination of the five-way and governor valves.

Recommended Practice

The committee on recommended practice suggested two important changes in its report which were adopted. These changes were as follows: "Only light repairs to be made to air compressors on locomotives in the enginehouse. If heavy repairs are required, air compressors should be removed from a locomotive and replaced with a tested compressor known to be in good condition. Replacement of air-cylinder packing rings in compressors having taper-fit rods to be considered as light repairs." Another recommended change read as follows: "Brake cylinder leakage should not exceed 5 lb. per min. from an initial pressure of 50 lb. and with standard piston travel. The phrase "a piston travel of six to seven inches" has been changed to read "standard piston travel."

Brake Equipment for Gas-Rail Cars

The Pittsburgh Air Brake Club presented a paper on brake equipment for gas-rail cars in which it discussed the operation of AML equipment in steam-railroad service. The paper pointed out that although this equipment is performing its function quite satisfactorily, due to the increasing use of rail cars in heavy branch-line service, and in some cases, in main-line local service, together with the assignment of locomotive enginemen trained to handling steam locomotives, a number of railroads have expressed a desire to use ET equipment on these cars. It appeared to be the concensus of opinion of those who took part in the discussion of this paper that a special form of ET brake equipment, designed expressly to meet the conditions peculiar to gas-electric rail car operation, would be the most desirable equipment for this class of service.

Passenger-Train Handling

J. A. Burke, assistant air-brake supervisor, A. T. & S. F., presented a brief paper in which he reviewed the various methods in vogue on various railroads for starting and stopping passenger trains. In starting a train, he said the engineman is often confronted with conditions wherein the locomotive cannot start the train without taking slack. In such cases he advised taking the slack on one car and, if this is not sufficient, then take the slack on the entire train. If steam has been used just prior to or in taking slack, he suggested that the independent or straight air should be applied before the engine is reversed. After the slack has been pushed back in a train, he said, the subsequent forward movement must be made gently if rough handling is to be completely avoided.

In discussing stopping trains, Mr. Burke said that with trains of eight cars or more the brake application should be made in reductions of from 6 to 8 lb., allowing sufficient time between reductions for the slack to move either in or out. At lower speeds, he said, the reductions should be made even lighter than those just specified. Experience has shown, he pointed out, that when a heavy brake application is made in one continuous reduction of brake-pipe pressure, bad surges are felt in the train.

The discussion of Mr. Burke's paper centered largely around the use of the independent brake valve in making passenger-train stops. Several roads forbid their enginemen to use the independent valve in handling passenger trains, while other roads apparently left the problem to the judgment of the engineman. After all, one speaker pointed out, it is results rather than procedure that are most desired. If one engineman can make a smooth stop by using the automatic valve alone while another feels he must use the independent valve to achieve the same results, why require either to conform to a definite rule when both men secure the desired result but by different methods?

The question of the time consumed in making a stop was also discussed at considerable length. One speaker pointed out that it was comparatively easy for an engineman to "sneak up" on a water spout after slowing his train down to a few miles an hour with the automatic brake and then spot his train with the independent brake. It was a different problem, he said, to make a stop from high speeds in 30 or 45 sec. These remarks were made after several speakers had endeavored to make comparisons in passenger-train handling between different railroads.

Moving Pictures of the Siskiyou Brake Tests

C. E. Chambers, superintendent of motive power and equipment, Central of New Jersey, who is chairman of the Safety Appliances Committee of the American Railway Association, spoke at the Wednesday morning session of the convention. He took advantage of the occasion to congratulate the association on the excellence of its work and emphasized its importance in the development of rail transportation. He closed his remarks by inviting the members of the association to view a showing of the moving pictures recently taken of the air-brake tests now being conducted on the Siskiyou line of the Southern Pacific. These pictures, which were shown under the direction of H. A. Johnson, director of research, American Railway Association, reviewed the progress of the tests from their beginning in the laboratory at Purdue University up to the present time. A number of views showing the testing of from 85- to 150-car trains were included in the films. Samples of the various records and charts were also shown. Road tests of the SC5 equipment are about completed. These tests will be followed by those of the SC3 equipment.

[Reports on the subjects, triple valve repairs, training of employees, brake-system leakage and the U-12-B valve will appear in a later issue.—EDITOR.]

Boiler Makers Meet at Pittsburgh

Discussion of modernized maintenance methods at twenty-first annual convention—Reports on corrosion and apprentices

MODERNIZATION of shop equipment to keep pace with the rapidly changing demands being made on the motive power of the country was the keynote of the opening address of President George B. Usherwood, supervisor of boilers, New York Central Lines, at the twenty-first annual convention of the Master Boiler Makers' Association. This convention was held at the William Penn Hotel, Pittsburgh, Pa., May 20 to 23, and was attended by more than 550 members, guests and members of the Boiler Makers Supply Men's Association.

In developing his recommendations for modernization, Mr. Usherwood stated: "With the changing locomotive practice, methods and equipment are being tremendously improved. There are a number of boiler shops operated by the railroads of this country and in Canada that represent the last word in modern arrangement and facilities. Unfortunately, they are too few. Most of them are plodding along with the same equipment and the same building arrangement that was modern 20, 30 or even 40 years ago. Present heavy boiler operations can be handled properly only with the aid of machinery that has been designed especially to accommodate them. Of course, it is not practicable for roads to scrap the plants they have and completely modernize them overnight. Nevertheless, it is in the interest of efficiency and economy to develop some comprehensive plan of improvement and carry it out over a period of time. In the process, not only can the physical layout of a shop be brought up to date, but boiler production tools can be installed to replace obsolete equipment. In addition, the facilities for the convenience of the personnel can be modernized. Since a man's efficiency depends largely upon his surroundings and well being, such things as proper lighting, ventilation, heating, safety precautions, good lavatories, and the like, should all be taken into account.

"Lately, the tendency on some of the larger systems has been toward the centralization of repair facilities on their various divisions. To a lesser extent, smaller

Officers of the Boiler Makers' Association

Seated (left to right): Retiring president, George B. Usherwood, supervisor of boilers, New York Central; president, Kearn E. Fogerty, general boiler inspector, Chicago, Burlington & Quincy.—Standing (left to right): Second vice-president, O. H. Kurlinke, boiler engineer, Southern Pacific; fourth vice-president, L. E. Hart, boiler foreman, Atlantic Coast Line; third vice-president, Ira J. Pool, division boiler inspector, Baltimore & Ohio; first vice-president, Franklin T. Litz, general boiler foreman, Chicago, Milwaukee, St. Paul & Pacific; treasurer, W. H. Laughridge, general foreman boiler maker, Hocking Valley; secretary, Albert F. Stiglmeier, general foreman boiler maker, New York Central.

roads have done much the same thing with a considerable degree of success in reducing shopping time and actually saving considerable locomotive maintenance expense. This merging of facilities would seem to be quite logical, and with the savings made by concentrating major repairs at a central plant great improvements would be possible. Instead of buying replacement equipment as necessary for shops scattered all over a given division or entire road, this same expenditure would result in a completely equipped modern repair plant capable of meeting any repair schedule."

Address by M. W. Hasset

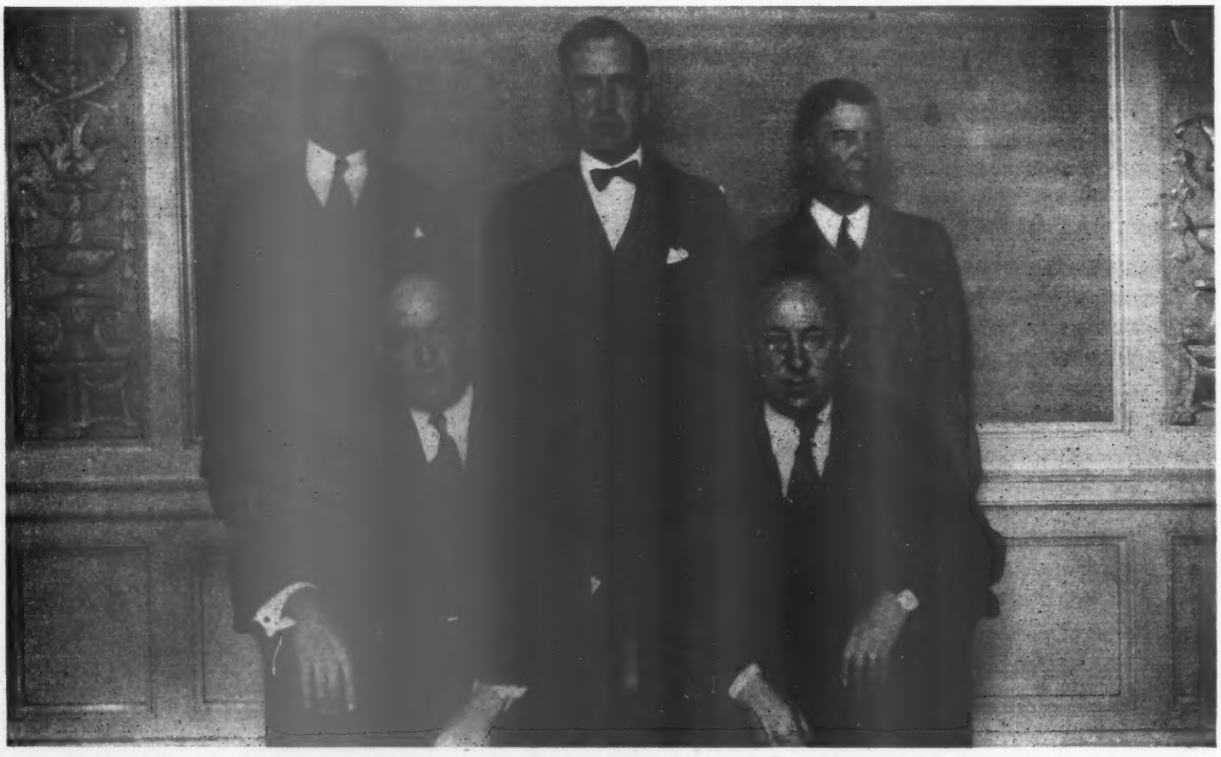
At the opening session M. W. Hassett, assistant superintendent of motive power of the New York Central, addressed the association on the development of the steam locomotive through the past century from its inception. "It may be truly said," stated Mr. Hassett, "that the last twenty-five, and more particularly the last ten years have marked the greatest of this development not only in the locomotive itself, but in every phase of railroad transportation. Equipped with every known device for safe and economical operation, the present-day use and performance of the modern locomotive are amazing in contrast with the locomotive of less than a decade past. It is now possible to extend the run of the individual locomotive to whatever distance the train it hauls may be scheduled to move, be that 300, 500, 800, or 1,000 or more miles.

"In the creation of the design of this splendid locomotive of today quite naturally came the boiler of increased proportions and increased pressures. To what extent locomotive boilers may profitably be designed, with resultant increased pressures, is problematical. We feel assured that continued research and experiment, combined with your expert knowledge and valuable suggestions, will sustain the march of industrial progress.

Chief Inspector Alonzo G. Pack of the Bureau of Locomotive Inspection, Interstate Commerce Commission, was to have addressed the association, but was unable to attend. In his absence R.H. Flynn, general superintendent of motive power, Pittsburgh district, Pennsylvania, made an address at the Wednesday session on developments that have taken place in recent years in railroad practice and the part the boiler makers can play in continuing the improvement in maintenance conditions.

Better maintenance of boilers was also the subject of W. G. Black, mechanical assistant to the president, Chesapeake & Ohio, who addressed the convention at the opening session on May 22.

At the final meeting an address which was prepared by C. A. Gill, superintendent of motive power, Baltimore & Ohio, was read in his absence by Ira J. Pool, division boiler inspector of the railroad.



Officers of the Boiler Makers Supply Men's Association

Seated (left to right): President, Irving H. Jones, Republic Steel Corporation; Executive Committee member, Harry Loeb, Lukens Steel Company.—Standing (left to right): First vice-president, Reuben H. Peabody, Air Reduction Sales Company; secretary, Frank C. Haase, Oxweld Railroad Service Company; treasurer, George R. Boyce, A. M. Castle Company. The second vice-president, E. S. Fitzsimmons, Flannery Bolt Company, was absent when this photograph was taken.

The technical sessions of the meeting were featured by a discussion on the subject of pitting and corrosion in locomotive boilers, which was participated in by many prominent water service engineers and metallurgists. Among those who have for many years worked closely with the master boiler makers in determining the practical results of water treatments on boilers in service and who were at this convention were F. B. Horstmann, chemical engineer, Dearborn Chemical Company; C. A. Seley, consulting engineer, Locomotive Firebox Company; F. J. Jenkins, general locomotive inspector, Texas & Pacific; R. E. Coughlin, su-

pervisor of water supply, Chicago & North Western; J. B. Wesley, engineer water service, Missouri Pacific; Dr. C. H. Koyl, engineer water supply. Chicago, Milwaukee, St. Paul & Pacific; Howard L. Miller, metallurgist, Republic Steel Company; R. N. Speller, director, department of metallurgy and research, National Tube Company and others.

Corrosion and Pitting

The problems incident to water treatment and water service were not presented in the report which was confined to ascertaining what improvements could be made in the construction and maintenance of the boiler and tender in helping toward a solution of the corrosion and pitting problems. It presented the advantages of using arch tubes, Nicholson thermic syphons and the Martin circulator in producing continuous and rapid circulation of water through the barrel of the boiler as a means of obtaining an equalization of the temperature of the water surrounding the tubes to increase their life and utility and to aid in the prevention of the pitting and corrosion of the boiler shell and fire box sheets.

Following is an abstract of the report which deals with the maintenance of the boiler: The interiors of boilers should be thoroughly cleaned when repairs are made in the shop. To offset corrosion and pitting on the barrels of boilers, improvement is obtained by coating the barrel, after inspection, with a cement solution composed of three quarts of cement to one gallon of water. This solution is applied with a gun similar to a sand blast or paint spray. Further improvement has been effected by applying 40 to 80 lb. of soda ash in the boiler, depending upon the size, after the boiler work has been completed and the hydrostatic test applied and before the boiler is fired up. This is done to clean any oil and grease from the surface and also to start a protective coating.

It has been noted that some corrosion and pitting was started by atmospheric rust while engines were laid up in storage. To overcome this trouble it has been found good practice to blow soda ash into the washout holes after the water has been let out. The spray gun does very well for this purpose. By spraying the soda ash into the boiler dry, it will create a dust which coats the interior and protects the steel while the boiler is out of service.

It is believed that one of the most important things that the boiler maker can do to improve corrosive condition is to keep in close touch with the water-supply department, advising them promptly when and where pitting trouble appears to be developing, so that they will be in a position to take immediate action in correcting the water conditions where necessary in order to relieve the situation.

Closely allied with the subject of corrosion from the standpoint of prevention is proper boiler washing and after the reading of the report this topic was discussed at some length by members from nearly every district in the United States and Canada. The symposium of practice presented covers practically every water condition to be found.

Apprentice Training

A very careful investigation of the practices in vogue today, regarding the developing and training of boiler maker apprentices, reveals that there is quite a variance in the schedules of training as between the larger systems and the smaller roads having less mileage and fewer locomotives. From the information and data gathered from the largest roads in the country, controlling 73 per cent of all the locomotives in service, the committee presented an average or typical course to be used as a suitable schedule for the training of boiler maker apprentices.

Suggested Course for Boiler Maker Apprentices

Tool room	1 month
Heating rivets	2 months
Flue work	3 months
Stay bolts	3 months
Riveting, chipping, caulking	3 months
Front-end work	1 month
Flanging, hand and machine	3 months
Ash pan	2 months
Enginehouse	3 months
Tank shop	2 months
Welding, forge and fusion	3 months
General work	8 months
Inspecting	3 months
Laying out	4 months
Machine work	2 months
Cabs	1 month
Patching and fitting up	4 months
	4 years

The school course should embrace mechanical drawing, mathematics, physics and related subjects, and it is very important to teach the method of calculating the strength of boilers, riveted joints, tension on plates, shear on rivets, stresses in stays and braces and other data shown on Federal boiler specification cards.

An unusual feature of this year's convention, made possible by Pittsburgh's location in the heart of the steel fabricating district, were inspection trips to the Ellwood City Works of the National Tube Company, the Homestead plant of the Carnegie Steel Company and the works of the Flannery Bolt Company.

Election of Officers

The latter part of the Friday morning session was devoted to the election of officers for the ensuing year: President, Kearn E. Fogerty, general boiler inspector, Chicago, Burlington & Quincy; first vice-president, Franklin T. Litz, general boiler foreman, Chicago, Milwaukee, St. Paul & Pacific; second vice-president, O. H. Kurlfinke, boiler engineer, Southern Pacific; third vice-president, Ira J. Pool, division boiler inspector, Baltimore & Ohio; fourth vice-president, L. E. Hart, boiler foreman, Atlantic Coast Line; fifth vice-president, William N. Moore, general boiler foreman, Pere Marquette; secretary, Albert F. Stiglmeier, general foreman boiler maker, New York Central; treasurer, W. H. Laughridge, general foreman boiler maker, Hocking Valley. Charles J. Longacre, foreman boiler maker, Pennsylvania, was elected chairman of the executive board.

Boiler Maker Supply Men Elect Officers

At a meeting of the Boiler Makers Supply Men's Association, held at the Hotel William Penn, Pittsburgh, May 22, in conjunction with the annual convention of the Master Boiler Makers' Association, the following officers were elected for the coming year: President, Irving H. Jones, Republic Steel Corporation; first vice-president, Reuben H. Peabody, Air Reduction Sales Company; second vice-president, E. S. Fitzsimmons, Flannery Bolt Company; secretary, Frank C. Hasse, Oxweld Railroad Service Company; treasurer, George R. Boyce, A. M. Castle Company. Executive Committee: (one year) M. K. Tate, Lima Locomotive Works; C. S. Wright, Oxweld Sales Company; George H. Raab, Bethlehem Steel Corporation; (two years) V. C. Kuhns, Burden Iron Company; H. N. Reynolds, Huron Manufacturing Company; Leslie Pyle, Locomotive Firebox Company; (three years) Thomas Mahar, American Arch Company; T. P. Champion, Champion Rivet Company; Harry Loeb, Lukens Steel Company.

EDITORIALS

Railroad Shop and Terminal Problems

IN its Annual Shop Equipment Numbers the *Railway Mechanical Engineer* for many years has attempted to deal in a special way with the shop and terminal problems of the railways. During the past two years all of the special articles in these issues have been related definitely to the problems involved in the selection, purchase and handling of machine tools and shop equipment, last year particular emphasis being placed on the direction which the future attitude of the railroads toward these problems seemed likely to take.

In the current issue we have adopted a more specific treatment of the broad problems of developing an adequate and economic shop and engine terminal program, in keeping with the definite trends in the programs of utilization and maintenance of equipment which are now under way.

Longer engine runs and the determined effort of the railroads to increase the utilization of locomotives by every means within their power have gradually resulted in a changed attitude on the part of the managements toward the engine terminal. In the development of this program of increased utilization there has been a definite tendency toward a decrease in the number of engine terminals in operation. While the longer runs which locomotives are now making have clearly demonstrated that the locomotive is capable of making much greater mileage before requiring mechanical work and servicing than was thought possible ten years ago, there has been some increase in the amount of mechanical attention required by locomotives at the ends of their long runs as compared with that required at the ends of the older short runs, and such work as is done at the ends of these runs is generally of a higher standard and much more thorough-going than that done at engine terminals ten years ago. Aside from the maintenance operations, the urge for prompt and efficient handling of the servicing and turning operations at engine terminals has been very greatly increased.

The article on the engine terminal in this issue sets forth the results of a study of a number of engine terminals in which modern facilities have been provided. This study points out clearly what these modern facilities have accomplished in expediting the movement of locomotives through the terminals and what they have contributed toward reducing the unit costs of handling.

Many a railway car department has found itself in much the position of the stepchild who must be content with the cast-offs of those who are more deeply enshrined in the affections of the parents. It is not uncommon to find car repairs being made in buildings and with tools which have long since been outgrown by the locomotive department and which have taxed the ingenuity of the supervisors in the car department to fit into any sort of systematized plan of operation. In an article dealing with this situation a competent car department supervisor has allowed his imagination sufficiently free play to permit him to assume a change of heart on the part of the parents toward the stepchild, and he has pictured, in practical terms, the results which this improvement in the family spirit effected in the material welfare of the family. A careful reading of the article may suggest that perhaps the stepchild may sometimes have missed opportunities for bringing about such a happy reconciliation by expecting the misguided parents to make more than half the advances.

Some of the larger railroads have long maintained production shops equipped for the conduct of manufacturing operations on a specialized basis, leaving the locomotive shop free to concentrate directly on repair operations to parts not requiring complete replacement. This practice, however, has been relatively limited.

With the growing concentration of locomotive repairs at fewer shops during the past few years, however, great impetus has been given to systematizing and specializing all the operations in the locomotive shop. This has prepared the way for a much more generally favorable reception to the idea of the employment of production processes in the machine shop.

In an article dealing with the possibilities of the turret lathe, suggestions for considerably greater systematization, leading to reduced out-of-service time for locomotives undergoing repairs, are offered by a practical machine shop foreman. While the article deals specifically with the possibilities for the use of the turret lathe, its suggestions are much broader than could be encompassed within the possibilities of any single type of machine tool.

The Atlantic City Exhibit

FROM June 18 to 25, inclusive, some 300 manufacturers of materials and appliances and builders of cars, locomotives, and tools used by the railways will participate in the biennial exhibit of the Railway Supply Manufacturers' Association. This exhibit, held during the conventions of the Mechanical, Purchases and Stores and Motor Transport Divisions of the American Railway Association, will be held in the new exhibition hall facing the ocean across the boardwalk, and will occupy both floors of the hall.

Not only will the vast variety of car and locomotive appliances and the many special materials applicable in car and locomotive construction be displayed in a setting designed to set forth their functioning or characteristics, but there will be a wealth of invaluable information pertaining to the application of special methods and processes of doing work in the shops. There will be special railway tools, portable pneumatic and electrical tools and a variety of small tools and precision instruments which can be of value in simplifying, systematizing and improving many essential repair operations.

This exhibit is assembled at no small expense to the companies participating in it. Its purpose is, of course, to develop sales of the products displayed. To accomplish this purpose, for which the exhibitors have spent

their money, it must also be of great educational value to every prospective purchaser and user of these types of materials and equipment.

Obviously, there can be no obligation to buy everything—or anything—exhibited. There is, however, an obligation, dictated by self interest if by nothing else, on the part of every railroad man who visits Atlantic City during course of the conventions to see and study every item in the exhibit concerning which a bit of additional knowledge may prove useful to him in the conduct of his duties. If this obligation is discharged the cost of the exhibit will have been justified.

All Shop Tools Not Yet Modern

DURING 1929 the records indicate that the railways as a whole purchased substantially more lathes, drill presses, cranes and material-handling equipment than in the preceding year. Other types of machine tools also were purchased, indicating an appreciation of the need for retiring obsolete shop equipment and substituting modern tools which will help reduce shop costs.

In spite of this desirable trend in railway shop equipment, there remains, of course, both room and the urgent necessity for further improvement in shop machine conditions. Many shops are still operated with inadequate crane service, necessitating three or four movements from the stripping pit over the transfer table to the erecting shop pit and back again before locomotives are finally turned out of the shop. In some cases locomotives have to be handled dead for long distances before they can reach a shop equipped to do the necessary heavy repair work. Wheel lathes are still in service which will not stand a feed much in excess of 3/16 of an inch per revolution. Worn-out boring mills, lathes and drill presses, 50 years old and more, limit production because their driving gear trains are too weak to support the cutting feeds and speeds made possible and desirable by cutting tools of high-speed steel. The original design of these tools is usually such that more powerful drives for one reason or another cannot be successfully applied.

One experienced and forward-looking shop superintendent was recently quoted as saying that what he needed most was more modern production milling machines and, next, turret lathes. Another shop executive has made a special study of the possibilities of grinding machines and is grinding not only piston rods, valve stems, guides and other flat surfaces, but is removing and grinding all crank pins on heavy-repair locomotives. He also is an extensive user of internal grinding machines and has experiments under way, looking toward a more accurate and smooth finish of piston-valve packing rings by grinding.

A significant comment on the part which modern machinery plays in efficient shop operation was made at the April meeting of the Western Railway Club by B. J. Farr, general superintendent of motive power and car equipment of the Grand Trunk Western, Battle Creek, Mich., who said that subsequent to the shopmen's strike in 1922, he had an inventory taken of machine tools at Battle Creek shops and embarked on a program of replacing antiquated with modern tools wherever an annual saving of 15 per cent on the investment could be secured. In three years, with the cooperation of the management, about $125,000 was spent for new tools, thus permitting a substantial increase in shop efficiency. Mr. Farr said that further extensive study and improvement of railway shop machine conditions are essential as well as a consideration of the man problem involved in getting the best returns from the investment in new shop equipment.

Fit the Material to the Service

THE automotive industry has demonstrated in a most remarkable manner the value of constructting motor cars of a variety of specialized materials each fitted to the class of service they are expected to perform. We refer specifically to the many different types and grades of steel that are found in the modern motor vehicle. The railroads, during the past five years, have seen the advisability of studying modern materials with a view to using them in equipment construction and maintenance work so as to prolong the service life of equipment. The result has been that the service expected from a modern locomotive between shoppings for general repairs exceeds, in many instances, 100,000 miles.

There would seem to be a fertile field for a similar study in car construction and maintenance—particularly in connection with freight equipment. Take the case of a steel hopper car for example. The average service life of such a car between rebuilding periods is from 10 to 12 years depending on whether the sheets in the car are plain carbon steel or copper-bearing steel. Except for wheel changes and journal-brass renewals—both of which are running repairs—the life of a freight car truck with cast-steel side frames is estimated to be 30 years. Therefore, except for such running repairs, the car may be considered to pass through the shops on an average of two and a half times for the rebuilding of the superstructure during the life of the trucks. To expect to extend the life of the steel superstructure to equal the life of the trucks is probably beyond the wildest dreams of the most optimistic master car builder but there seems to be no logical reason why an average life of 15 years should not be sought.

Would it be worth while? Two and a half general shoppings on a $2,200 steel hopper car at an average of $500 a shopping would be a total of $1,250 or, over a period of 30 years, an annual average of $41.66. Two shoppings at the same average cost for each would bring an average annual cost for maintenance of $33.33—a direct annual saving of $8.33 a car. On a road with 1,000 such cars the annual saving would be $8.333 or $249,900 in 30 years. At $2,200 apiece this would buy 113 new cars in 30 years.

Why isn't the average life of a hopper car 15 instead of 10 or 12 years? There are two reasons: abrasion and corrosion, both concerning steel sheets. Abrasion shortens the life of the slope sheets, cross hood and center ridge of the car while corrosion attacks the inside and outside hopper sheets, hopper doors and the side and end sheets at the sill connections. Taking a leaf from the notebook of the automotive industry the logical solution would seem to be the selection of different materials for different locations in the hopper car. Why not build the car of plain carbon steel sheets where abrasion and corrosion are not serious and then in the locations mentioned above apply tough abrasion-resisting materials in the slope sheets, cross and center ridges and special corrosion-resisting alloy-steel or wrought-iron sheets in the hoppers and at the sill con-

nections. The material in the rivets should also be made the subject of a searching study. All of the sheets should be sandblasted before painting and all of the seams and joints coated with an effective rust-resisting compound before riveting up.

Obviously, to wait 15 or 30 years in order to determine the best materials to put into a car today is out of the question. The solution is in a carefully conducted series of accelerated tests of all of the materials available today which might meet the requirements. In such a series of tests the many manufacturers would undoubtedly be quite willing to co-operate.

Where Is "Top Sergeant"?

A READER in Birmingham, Ala., wrote us a short time ago as follows:

While visiting a railroad shop recently I found the general foreman still raving about "Top Sergeant," whose letter appeared in your issue of August, 1925. He said he would like to ask the editor whether "Bill Brown," who was ridiculed so much at that time, was still in the railroad business, or whether he had made his fortune by this time selling hymn books, as it was suggested that he would be doing. This caused me to start wondering whether these two extremists have changed their views at all, since the interesting discussion took place in your columns. Not that I wish to see or to start another such outburst as we got from Top Sergeant, but merely because it would be an interesting piece of psychological information to know what sort of progress has taken place in the five years which have since elapsed.

We happened to know how we could reach Bill Brown and sent him a copy of the letter. He replied in part as follows:

Bill Brown is not as yet selling hymn books. He still thinks the shop employees fully entitled to and deserving of humane, courteous and considerate treatment by all to whom they are responsible for their work. He believes also that were as much consideration and care bestowed upon them as is usually given to his car, a supervisor's success would be assured—and his job would be one of some pleasure and little grief. He still believes, also, that, for every man from whom the foreman would get what Top Sergeant calls "presumptious imposition" on account of square treatment accorded, there would be a hundred who would respond and become for that reason highly efficient, appreciative and thoroughly co-operative, offsetting many times over the loss due to the fellow whom Top Sergeant mentions.

In reading over again Top Sergeant's statement in the August, 1925, issue, I find that he says in speaking of new tools, "I believe in making the old tools last as long as possible. Just keep them in repair and much can be accomplished." And right here, I believe, is where Top Sergeant should apply his tool philosophy to his men, instead of to his machinery. When he realizes this and makes the transfer of effort, he will find himself, for in spite of his "hard-boiled" attitude he cannot be happy while too busy even to unwrap his mechanical magazines or talk to salesmen. Then he will try "fitting" instead of "firing" men.

Yes, Bill Brown still thinks as he did in 1925. He is still a Rotarian, still finds time to go to church and sometimes talks to his apprentices. He still thinks that if a man is reasonably sure of his job he is a better employee. He still has hopes that all Top Sergeants as a class, will soon disappear.

It is several years since we have heard from Top Sergeant. If he reads this, we hope he will get in touch with us and let us know how he is getting along. Great changes have taken place in the past five years in this country in the attitudes and relations between the men and the managements on the railroads, as well as in the industries. Possibly Top Sergeant may have been influenced by these changes. At any rate, regardless of his present occupation or the effect that the experiences of recent years may have had upon his thinking, we shall be delighted to hear from him.

Treating Car Lumber

IN a highly informative report before the last annual meeting of the American Wood-Preservers' Association, the Committee on Treatment of Car Lumber stated that 33 out of 37 commercial treating plants in this country treated a total of 3,131,845 board feet of lumber in the last 12 months in the form of car sills, decking, flooring, roofing and nailing strips. Practically all of this lumber was treated with creosote with a range in absorption of from 6 to 12 lb. per cu. ft., a small amount of decking and flooring having been treated with zinc chloride or Wolman salts. Fourteen out of a total of 19 railroad plants reported treating 1,197,566 board feet with creosote and 42,480 ft. with zinc meta-arsenite, this lumber being used in 920 cars, chiefly for sills and decks of coal cars, decks of ballast cars, running boards and saddles of box cars, nailing strips of steel flat cars and roofing of refrigerator and stock cars.

In view of the favorable reports from many roads regarding the use of treated lumber for certain classes of car parts, it can hardly be questioned that the total amount of treated lumber mentioned above, while quite large in the aggregate, represents but a fraction of the treated lumber which railroads would be economically justified in using. Lumber preservatives now on the market possess certain characteristics which make railroads hesitate to use them for some car parts subject to frequent replacement on account of decay, and it would obviously not pay to undertake the extra expense of using treated lumber in places where the mechanical wear is sufficiently great to necessitate renewal in advance of normal failure by decay. Excessive mechanical wear and abuse, however, can and should be controlled, and this condition will doubtless prove a less potent reason for deferring railroad use of treated car lumber as time goes on.

Some roads are now building flat cars entirely of creosoted lumber, that is, including nailing stringers, blocking, decking, etc., and the advantages of this material for gondolas and, in fact, all open-top cars are generally admitted. Other roads are testing the application of treated lumber to stock-car floors and sills, refrigerator roofing boards, running boards and running-board saddles. It is not always advisable, however, to use treated lumber in stock cars, where some possibility exists that they may be required for the handling of watermelons, sugar beets, potatoes, etc.

While it is true that steel cars are to a large extent replacing wooden cars in railroad service, the fact remains that a tremendous volume of freight is still carried in cars primarily of wood, or composite wood and steel construction and will be for years. In the interests of reduced maintenance costs and out-of-service time, it is important, therefore, that the railroads give more consideration than they have in the past to the use of treated car lumber and overlook no opportunity to capitalize on the peculiar ability of this material to resist depreciation and decay as a result of age and weathering.

With the Car Foremen and Inspectors

Reclaiming Car Axles

THE Chicago & North Western has recently installed in its car blacksmith shop, at Chicago, complete equipment for reclaiming car axles by forging new wheel seats and journals of the next smaller size. Axles having 5½-in. by 10-in. journals, for example, are forged down to 5-in. by 9-in. journals. The equipment was placed in service January 13 and in the succeeding 37 working days to February 28 a total of 734 axles of this size were reclaimed at an estimated saving of $13 per axle, this figure, however, including a certain fixed amount which must be charged off for overhead, interest and depreciation on the equipment.

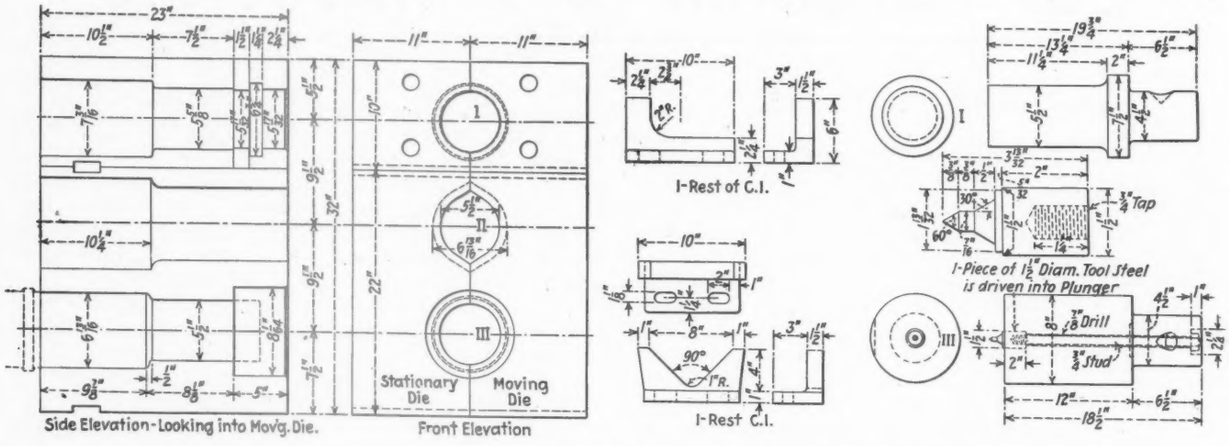
The special equipment installed to handle this work includes one Ajax 6-in. heavy-duty twin-geared upsetting forging machine and dies; one oil-fired preheating furnace with a capacity for heating seven axles at one time; one shop-made car-bottom annealing furnace, oil-fired and pyrometer-equipped, which has a capacity for annealing 56 axles at one time; one revolving jib crane and Milwaukee two-ton electric hoist which serves both furnaces and the forging machines; and two Chisholm-Moore one-ton electric traveling hoists arranged on runways for handling axles to the storage piles.

In operation, the car wheels are removed from the scrap axles which are carried on the monorail electric hoist to a storage rack inside the blacksmith shop. They are then handled, one at a time, by the jib crane, to the heating furnace, which is usually kept fully charged with seven axles. The axles are heated to about 1,800 deg. F. in this furnace, then being moved by a special axle-handling device to the forging machine. Three men are required to handle the axle during the forging operation, including one machine operator, one heater blacksmith and one helper (heavy fire.) Ajax three-position dies are used in forging the new axle ends. In the upper position the heated journal is loosely held in the two halves of the die, the operation of the plunger pushing the journal through the collar which falls into a recess underneath the machine. This is done in a single stroke of the machine. In the middle position, the slightly elliptical-shaped dies squeeze the wheel seat, elongating the journal to give additional stock to make the collar. This is done in two strokes of the machine. In the lower position, the collar is formed and the lathe center hole pressed in the end by a single stroke of the machine. Three die positions and four strokes of the machine therefore, are all that are required to make the new axle end.

After forging one end, the axle is moved back to the storage rack for cooling, after which it is again taken to the heating furnace and forging machine for forming the other end. When both ends have been reforged, the axle is loaded on a special firebrick-lined car and taken with other axles to the annealing furnace, where it is heated to a temperature of 1,000 deg. F.,

Removing axle from the heating furnace, which has a capacity to accommodate seven axles at one time

as determined accurately by modern pyrometer equipment having four leads to the furnace. As soon as the temperature has been brought up to 1,000 deg., the fuel is shut off and the furnace allowed to cool for 24 hours, thus thoroughly annealing the axles and relieving any forging or internal stresses which may have developed.



Forging machines dies and tools used in reclaiming 5½-in. by 10 in. to 5-in. by 9-in. car axles

The car axles, reclaimed by this process and carefully annealed, are the equivalent of new axles. In fact there is some expectation that they will give better service than new axles, owing to the additional working of the metal. The Ajax forging machine is provided with extra powerful die-gripping mechanism and a special pedestal base-plate back-stop. The sides are of the top-suspended type with twin-gearing drive on the crank shaft. Protection against over-stressing the machine is provided by the self-adjusting, collapsible safety pitman behind the header slide and the safety breaker bolt knuckle of the die slide mechanism. The machine will accommodate dies 32 in. high and handle any size of axle up to 6½ in. by 12 in. While a set of dies and heading tools is needed for each size of axle to be reclaimed, economy can be effected in this particular by making the dies double faced; in other words, grooving both sets of die faces, one for one size of axle and the other for another size.

The production of 734 reclaimed axles at the North Western shops in 27 working days gave an average of only 20 axles a day, which was substantially less than will be obtained on the next run of axles when the machine is thoroughly broken in, final adjustments made and the men more experienced in handling this particular job. In fact, up to a certain production of about 100 axles per eight-hour day, the output of the forging machine is limited not by the machine itself but by the efficiency of the axle-handling facilities, and

Three men handle axles during the forging operation in a new Ajax 6-in. machine—The annealing furnace is in the left background

by the capacity of the heating furnace, which may in some cases be designed with a preheating chamber through which the axles roll by gravity to a high-temperature chamber where they are raised to the forg-

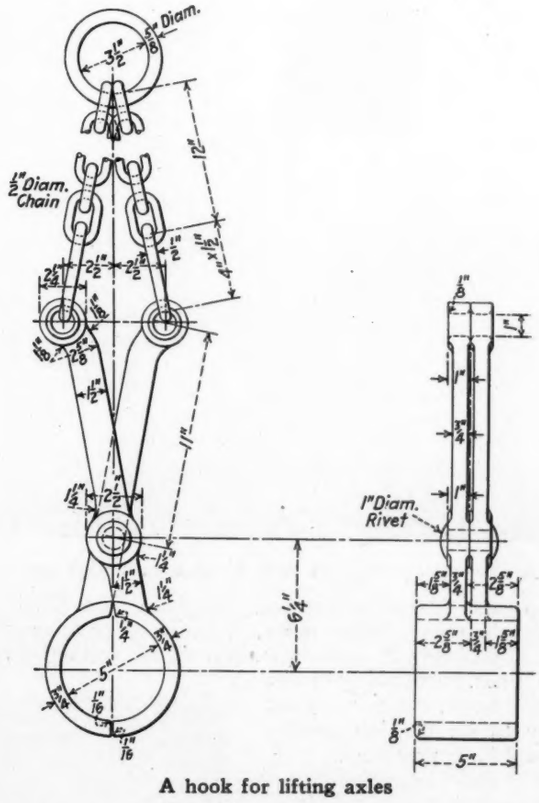
Reclaimed axle-storage racks served by Chisholm-Moore one-ton electric monorail hoist

ing temperature. In addition to reclaiming car axles, the North Western expects to use the forging machine for other heavy car and locomotive forging work.

Close-up view of the 6-in. forging machine showing the three-position dies and axle-handling device

A Useful Axle Hook

BECAUSE of the ease with which axles can be handled and the manner in which this particular kind of work is facilitated by the axle hook shown in the drawing, the road which designed it has adopted it as standard equipment for car and locomotive shops. The hook is of tong construction and is forged from ¾-in. by 1½-in. iron with grips 5 in. wide welded to each arm. The arms are bossed and drilled at one end to provide connections for chain links which are of ½-in. construction. They are also bossed and drilled 11 in. from the chain connections to provide a fulcrum point where the arms are held together by means of a 1-in. rivet. The chain, 16 in. in length, is suspended from a 3½-in. diameter ring that is forged and made from ⅝-in. iron.



A hook for lifting axles

In using the hook it is only necessary to drop the grips over an axle and raise the hoist, thus eliminating the necessity of moving the axle with a bar or by hand or otherwise rolling it in position over a chain preparatory to raising it with a crane.

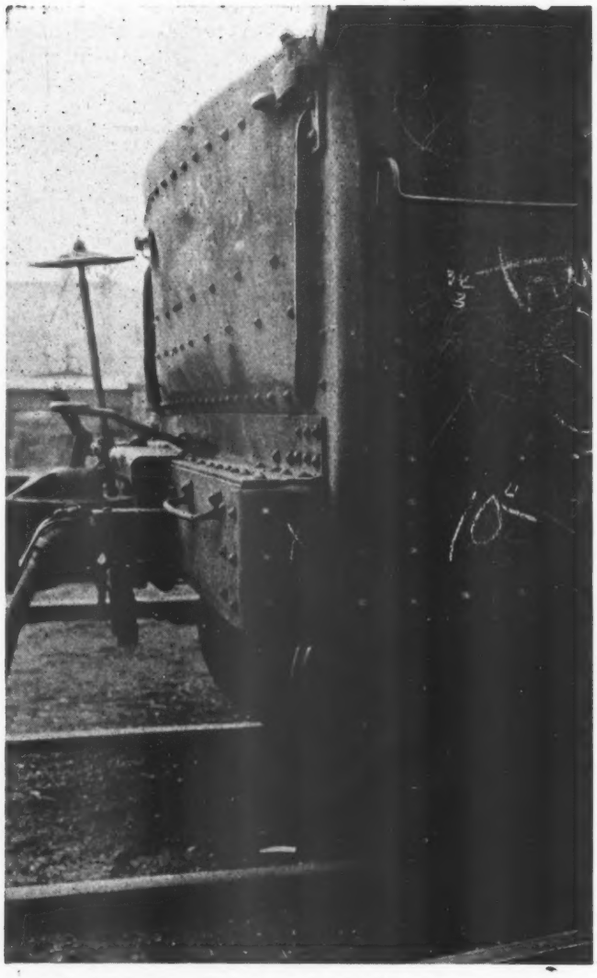
PROBATING OF THE WILL of Samuel M. Felton, late chairman of the board of the Chicago Great Western, involves the disposal of the most unique collection of locomotive models ever gathered together. It is composed of silver and gold models, including one of the locomotives that took Abraham Lincoln to his first inauguration. This was given to Mr. Felton by his father, who was president of the Philadelphia, Wilmington & Baltimore (now a part of the Pennsylvania), over which the train ran. Also included in the collection are a number of miniature locomotives presented to Mr. Felton by the French government, as a recognition of his war-time service.

Straightening Warped End Gates on Gondolas

THE end gates on gondola cars, like all steel car ends, often become quite badly battered and bulged out in service and when the cars go into the shop or the repair yard it has been the usual custom to remove the drop gates from the cars and straighten them out in a hydraulic press. When cars are in for general repairs this is probably the best way to do a good job but there are times, particularly on the "rip" track, when a good way to do the job quickly would be appreciated.

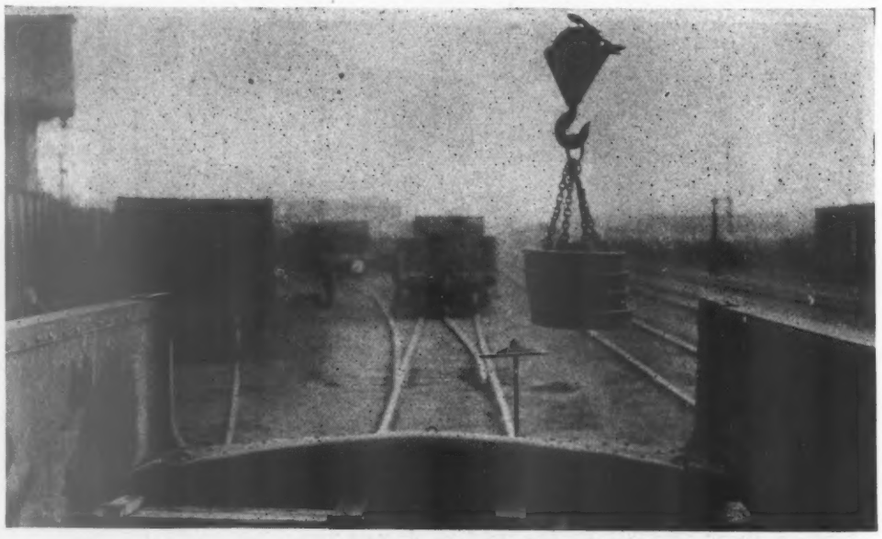
A view of the end gate after it has been straightened

The illustrations which accompany this article show an idea that was developed at the Lorain, Ohio, car repair yards of the Baltimore & Ohio, where most of the steel cars used in the coal and iron ore movements in the Lake Erie district of that road are repaired. For the sake of comparison two methods of straightening the end doors are shown, one the shop method using the press, and the other the emergency method. To remove the doors from the car, take them to the shop, straighten them, return them to the car and replace them would take at least from an hour to an hour and a half. The other method takes from 10 to 20 min., depending entirely on the amount of switching that must be done.



This shows the end of the car before it was repaired

The tools required to do the job consist principally of a few pieces of wood for blocking, four cast-iron or



The door is laid back on the car floor on blocks

steel car wheels, three eye-bolts long enough to fasten the wheels together and the services of a locomotive crane and the operator. A crane other than a locomotive crane would do the work just as well provided a drop of the crane hook of at least 20 ft. could be obtained.

One of the pictures shows a close-up view of the end of the car before any straightening was done. It was bulged out some distance—just how much can better be seen in the view which shows the bend in the door when it was laid back on its hinges on the floor of the car. This, incidentally, is the next step in the operation of straightening. If the work is to be done with a locomotive crane, the crane is run up on another track alongside the car. The four car wheels have been bolted together with three eye-bolts and fitted with the necessary chains to hang them on the crane hook. By using the car wheels a drop weight of from 3,000 to 3,300 lb. is obtained.

The crane operator swings the boom of the crane around and rests the car wheels on the high point of the bend in the door. The weight is then lifted up to the point of the boom, the brake released from the hoisting drum on the crane and the weight drops through the 20 ft. on the door in about one second. Just what the impact amounts to in foot-pounds is not particularly important in this case but it does an excellent job of straightening the bent end gates in about three or four drops of the car wheels.

Journal-Box Packing Press

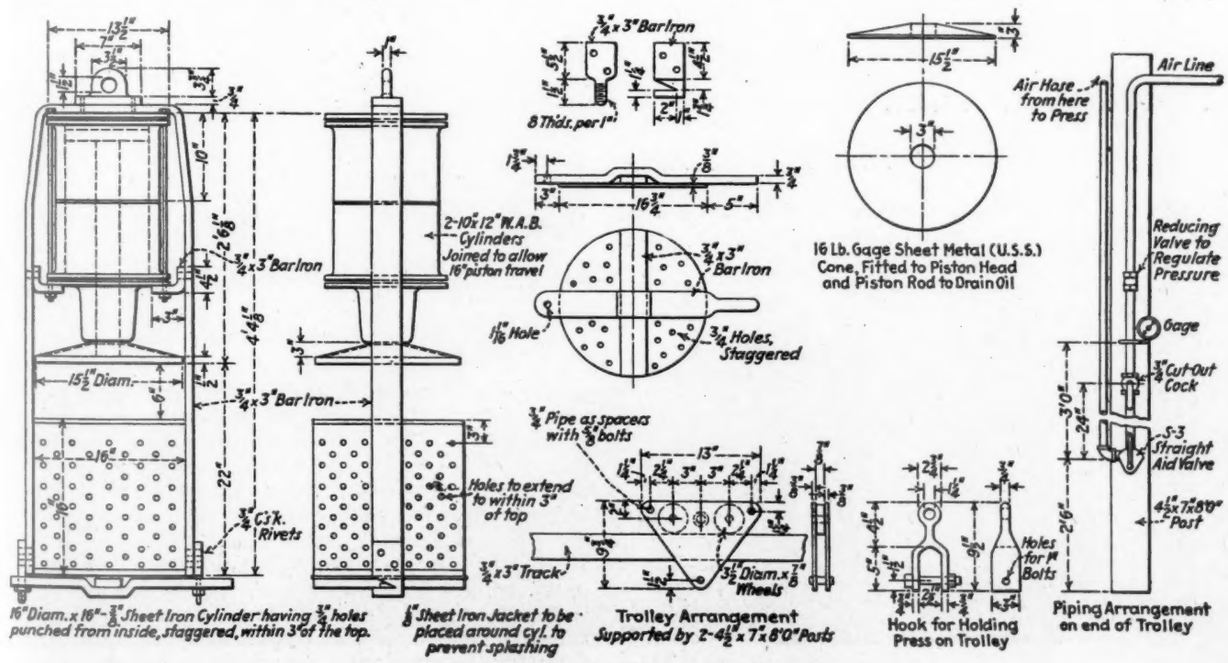
A PRESS which serves as a quick and efficient means of pressing oil from journal-box packing is shown in the drawing. It consists of two 10-in. by 12-in. air-brake cylinders, joined together to obtain a 16-in. piston travel, set above a perforated sheet-iron cylinder which serves as a depository for the packing. These are bolted securely in a frame which is suspended from a trolley.

The sheet-iron cylinder is 16-in. in diameter and is perforated with staggered ¾-in. holes, punched from the inside. The piston head is fitted with a 16-gage sheet-metal cone which serves as an oil drain for the piston head after the piston has pressed the oil from the packing. The bracket in which the packing cylinder and air cylinders are bolted is made of ¾-in. by 3-in. bar iron and is constructed as shown in the drawing. The trolley from which the press is suspended is equipped with ⅞-in. wheels, 3½ in. in diameter, and runs on a ¾-in. by 3-in. track supported by two 4½-in. by 7-in. by 8-ft. posts.

The piping arrangements of the press, as shown in the drawing, consists of a reducing valve to regulate the air pressure, an air gage, a ¾-in. cutout cock and an S-3 straight-air brake valve. When the perforated cylinder is filled with packing, compressed air is admitted to the brake cylinders by means of the S-3 brake valve. The piston compresses the packing in the sheet-metal cylinder, forcing the oil through the perforations. A ⅛-in. sheet-iron jacket is placed around the cylinder to prevent splashing.

Filing Air-Compressor and Triple-Valve Rings

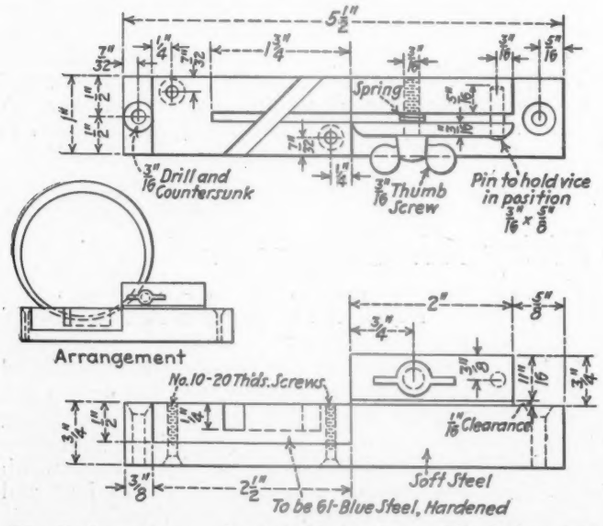
THE jig illustrated is one that has been designed to hold air-compressor valve rings and triple-valve piston rings while filing them preparatory to fitting them in the valve chamber or cylinder. The jig is composed of a soft-steel block, 5½ in. long, 1 in. width and ¾ in. thick, with a raised portion, 2 in. long and ¾ in. high, located as shown in the drawing. It is machined to a depth of ½ in. for a distance of 2½ in. to accommodate a blue-steel hardened block. The block is slotted diagonally and horizontally as shown and is held in the jig by two No. 10 screws. Two blocks are used with the jig, each having a different width of



A press for removing oil from journal-box packing

slot. One block is used when filing air-compressor valve rings and the other when filing triple-valve piston rings. The raised portion of the jig acts as one jaw of a vise, the other jaw being a 3/16 in. by 11/16 in. by 2 in. piece of soft iron held in alignment by a 3/16-in. by 5/8-in. pin and held apart from the solid jaw of the vise by a small coil spring. There are two 3/16-in. holes drilled and countersunk at each end of the jig for fastening it to a work bench which is accomplished by 1/8-in screws.

The ring to be filed is set in the horizontal slot of the jig and passed through the jaws of the vise which are clamped together by means of a 3/16-in. thumb screw. When the ring is filed to fit in the cylinder or

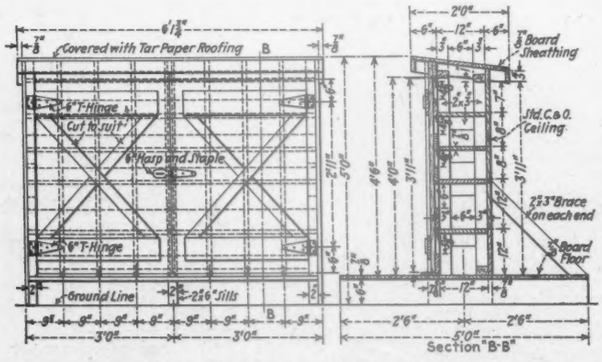


The jig is used as a vise to hold the rings while fitting them

valve chamber, as the case may be, it can be steadied in the diagonal slot of the jig for whatever touching up, filing, grinding or other work that may be necessary.

A Material Rack for the Rip Track

THE material rack shown in the drawing is 5 ft. high from the ground to the roof and is set on

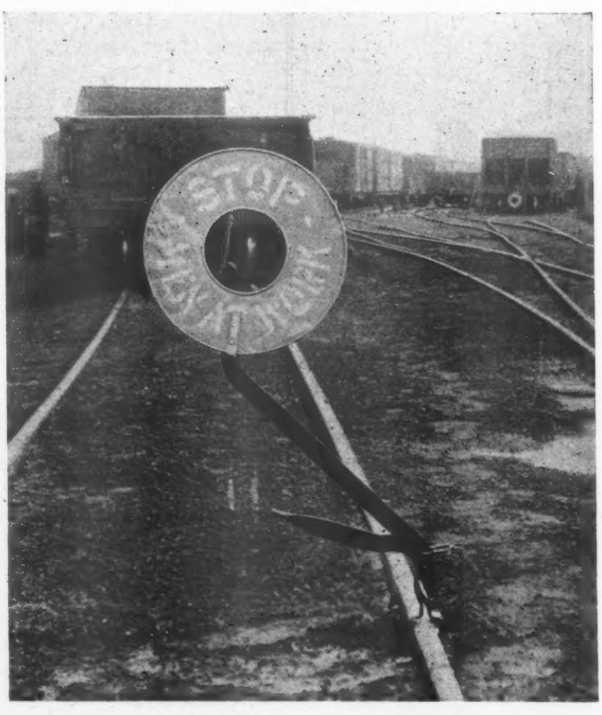


A convenient material track

a 5-ft. by 6-ft. platform of 7/8-in. floor boards, nailed to three 2-in. by 6-in. sills. It is 4 ft. 2 in. high from the platform to the eaves and is centered on the platform and braced behind by two 2-in. by 3-in. boards, one at each end of the rack. It is comprised of five bins, 12 in. deep, which run the length of the rack and which are spaced at 12 in., 12 in., 8 in., 8 in. and 7 in., respectively, beginning at the bottom. It is furnished with two doors which swing on 6-in. T-hinges and which are locked by means of a 6-in. hasp and staple. The sloping roof of the rack is made of 7/8-in. board sheathing has 3-in. boards for eaves, and is covered with tar-paper roofing.

A Good "Blue Flag"

THE Baltimore & Ohio has adopted the "blue flag" shown here. It is simple to apply, pleasing in appearance and when placed in position on the rail, stays there until removed by an authorized employee. It consists of a disc, in reality more nearly a ring since it is open in the center, on which is stenciled the words "STOP—MEN AT WORK." The letters are white on



When this "blue flag" is locked in place it can not be removed by unauthorized persons

a blue background. The disc is supported by a strap iron standard which is shaped at the bottom to fit a 90 or 100-lb. rail. The bottom of the standard resembles a pair of odd-shaped tongs which grasp the rail. When the jaws are closed a switch lock through holes drilled in both pieces prevents the "blue flag" from being removed. This flag is similar to that described in the August, 1928, *Railway Mechanical Engineer,* page 457. The improved flag, however, has been made lighter in weight and easier to apply to the rail by shortening the mast and clamping handle, and by drilling and placing the holes for the standard safety padlock directly over the tongs.

In the Back Shop and Enginehouse

Front Frame Welding

A CERTAIN class of heavy locomotives on the Illinois Central, equipped with vanadium cast-steel frames, developed rather serious breakage trouble just back of the cylinders. The break usually occurred in the form of a progressive fracture in the upper rail and then, if it was not repaired, the lower rail also failed. The location of a typical crack is indicated by a pencil mark in one of the illustrations, although most of the cracks developed initially to the left of the one shown.

Various remedies were tried without success. For example, a section of the original frame was cut out and a forged reinforced section set in by gas welding. Other welding processes were attempted, also unsuccessfully. Reinforcement plates were applied and failed. The final decision was to apply a new front frame of forged open-hearth steel, designed with a redistribution of the metal to give substantially greater strength. It was planned to include the front frame jaw with this section and join it to the main frame by a weld over the center of the front jaw.

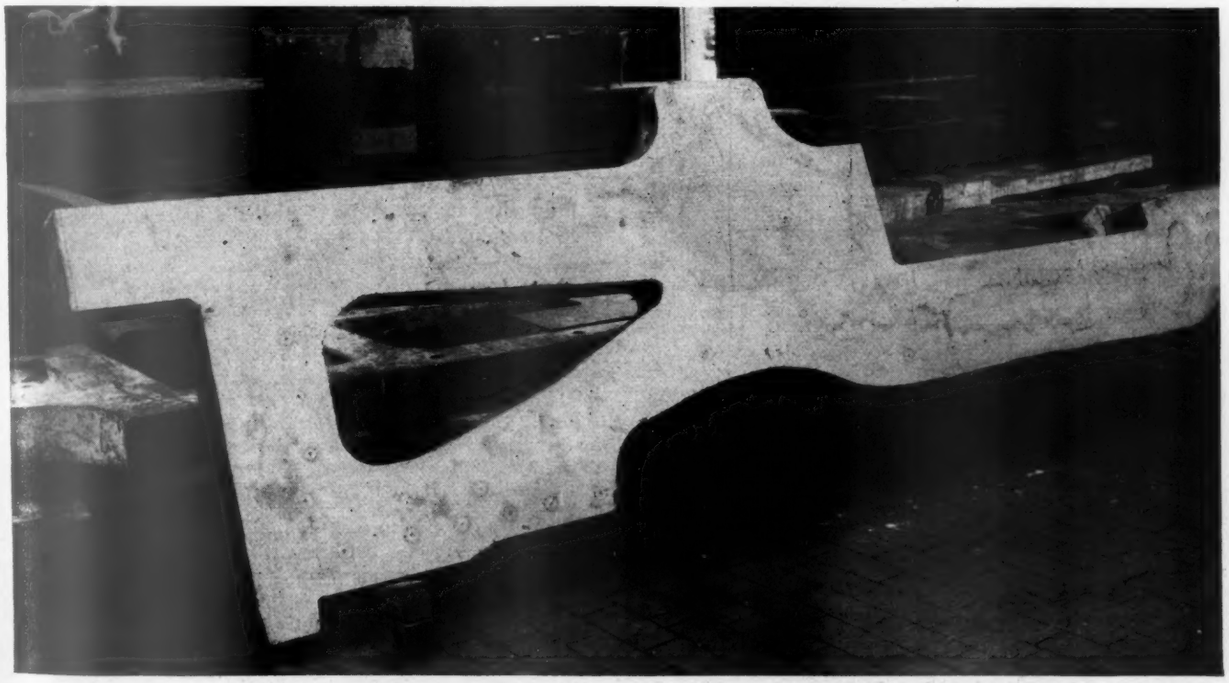
Inasmuch as a considerable number of locomotives were involved in this change-over work, carefully conducted tests were made to determine, if possible, the best method of joining the new front frame sections to the old frame. Test welds of open-hearth and vanadium cast steel pieces were made with the oxy-acetylene torch, by electric welding, by bronze welding and by the hand forge method. Tension and bend test specimens were machined and tested, the results being compared with those obtained with test pieces cut from the original metal. The results of these tests, considered from the point of view of tensile strength, elongation, reduction of area, hardness and resistance to the bending test, are given in the attached table.

Results of Bend Tests of Welded Specimens

Kind of weld	Hardness, Brinell ball test 10 m.m. ball 3,000 kg. pressure: Vanadium steel piece	Weld	O.H.S. spec. 19-c piece	Angle of bend, deg.	Remarks
No. 1 rod steel and acetylene torch	191	...	119	90	Minute cracks, the largest 1/16 in. long and 1/16 in. deep.
Wanamaker wire and electric arc	156	...	126	37	Only one crack 5/8 in. long and 1/8 in deep.
Tobin bronze and acetylene torch	158	...	126	42	Cracks all way along bend from 1/16 in. to 1/4 in. long and 1/8 in. deep.

None of the specimens was heat-treated. The welded tensile specimens were machined down to 9 in. long by 2 in. wide in the test section, and 9/16 in. thick, or 1/16 in. thicker than the unwelded specimens. The welded bend specimens were machined down to 10 in. long by 1¾ in. wide by 9/32 in. thick. The tensile strength tests were made in a wheel press machine in the tank shop, using special jaws shown in the drawing.

The method of making the weld selected, as a result



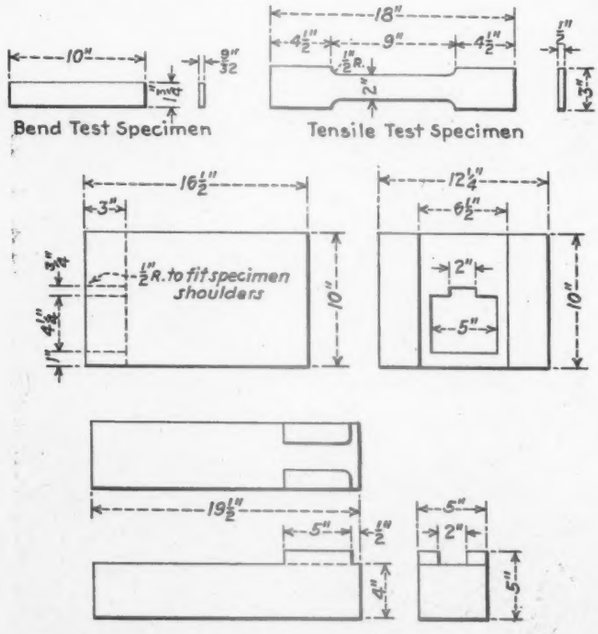
Redesigned and strengthened front frame section laid out ready for drilling

of these tests, as most likely to be satisfactory was with the oxy-acetylene torch. Frames were machined to allow for keys, both front and back of the cylinders, so it would not be necessary to get expansion by force. The frames were set ¼ in. apart before welding and cut to a 60-deg. angle, allowing ¼ in. for contraction. When the frames were in place and ready to weld, a charcoal basket or furnace was put in place, extending 6 in. on either side of the weld. This basket was filled with charcoal and a slow fire started to bring the temperature of the frame up very slowly. After the frame had reached a temperature of approximately 800 deg. F., an oil burner was applied to increase the temperature to about 1,700 or 1,800 deg. F. The frames were welded with No. 1 steel welding rod, using two acetylene torches. As the welding progressed, additional charcoal was added to keep the frame heated until the weld was completed.

Results of Tensile Tests of Welded and Unwelded Specimens

Specimen No.	Specimen	Kind of weld	Tensile strength, lb. per sq. in.	Elongation in 8 in., in.	Reduction, per cent		Location of break from center line of weld on O.H.S. 19-c piece	Hardness, Brinell ball test 10 m.m. ball 3,000 kg. pressure		
					Width	Thickness		Vanadium steel piece	Weld	O.H.S. spec. 19-c piece
1	Vanadium cast steel and O.H.S. spec. 19-c	No. 1 rod steel and acetylene torch	94,000	1-1/32	25	25	2	170	149	149
2	Vanadium cast steel and O.H.S. spec. 19-c	Wanamaker wire and electric arc	92,000	1-5/16	25	31.3	2¾	170	138	153
3	Vanadium cast steel and O.H.S. spec. 19-c	Tobin bronze and acetylene torch	60,000	1/16	None	None	At center line	166	105	121
4	Vanadium cast steel and O.H.S. spec. 19-c	Forge	84,000	3/8	7	6.3	*	255	121	116
5	O.H.S. spec. 19-c	None	84,000	2-1/2	31.3	25	2	...	...	149
6	Vanadium cast steel	None	125,000	23/32	4.7	6.3	No break	179	...	...

* No break on one end. Lap got loose ¼ in. by ¾ in. by 1 in. long.



Jaws for use in breaking tensile-test specimens in a wheel press

After the weld was completed, the basket was filled with charcoal and the frame brought up to an even temperature the full length of the basket with the view of normalizing the metal as nearly as possible. The above method was used to insure a good metal structure in the weld; also the heating with a charcoal fire first, before applying the oil burner, was to insure no harm to the vanadium steel on account of rapid heating. The heating of the frame after welding and subsequent slow cooling normalizes the steel and prevents any uneven structure of metal in or near the welded part. The weld is reinforced approximately ¼ in. on each side. Some of these welds have been running in heavy service over a number of months and give no indication of failure.

Pencil mark indicates location and extent of progressive fracture in the old frame

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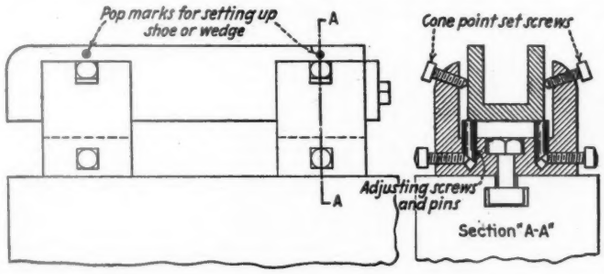
CHESAPEAKE & OHIO locomotive 1530, one of the largest Mallets on the system, furnished heat for more than 1,600 patients and 200 staff members at the Western State Hospital, in Staunton, Va., when fire of undetermined origin destroyed the hospital's boiler house and put out of commission its seven boilers. The fire occurred when that section of Virginia was in the grip of an almost unprecedented cold spell. The first thought, of course, was for the comfort of the inmates. When it was realized that the boiler house was doomed, Dr. Joseph S. DeJarnette, superintendent, telephoned Governor Byrd, and the state's chief executive got in touch with Chesapeake & Ohio officials and asked their aid. A small engine was promptly shifted to the hospital side track and a steam line run from its boiler to the institution's heating plant. At the same time, a big Mallet was ordered from Clifton Forge, and it arrived early in the afternoon and took the place of the small locomotive. It was kept fired to the limit, and every pound of steam that its immense boiler could generate was sent through the pipe line to the heating plant.

Jig for Machining Shoes and Wedges

IN the illustration is shown a shoe-and-wedge chuck that can be used for production work on a planer or for a single operation on a sharper when shaping or planing the frame side of shoes and wedges. After the shoe or the wedge has been laid off it is placed in the jig and leveled by the adjusting screws and pins shown in section *A-A* of the drawing. When leveled it is held securely in position by cone-point set screws.

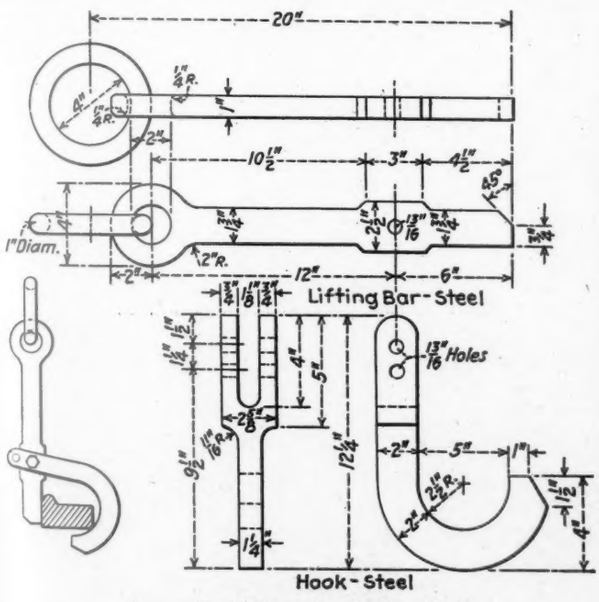
The device is so designed that as many as is desired can be used at one time, the number used in one set-up depending on the size of the machine bed or on the number of shoes and wedges to be planed. Usually a complete set of shoes and wedges are planed at one time.



Jig for planing the frame side of shoes and wedges

A Tire Clamp

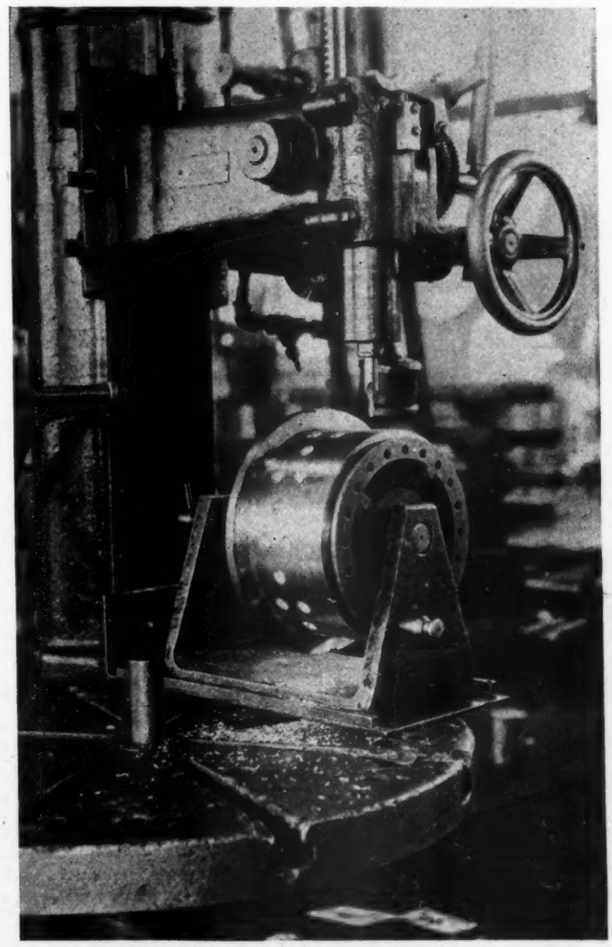
THE tire clamp or lifting hook shown in the illustration is one that can be used for conveying locomotive driving wheel tires in a vertical position by a crane or hoist. The clamp is composed of two pieces, a hook and a lifting bar, the hook being pivoted 6 in. from the bottom of the bar by a ¾-in. bolt. The bar is 20 in. long, 1 in. thick and 1¾ in. wide. One end of the bar has a 2-in. eye in which is placed a ring 1 in. thick and having an inside diameter of 4 in. The hook, made from 2-in. by 1¼-in. material, is 12¼ in. long and is bent on a 2½-in. radius. When in use the clamp is attached to the crane or hoist by means of the 4-in. ring. The lifting bar is lowered against the side of the tire and the hook dropped into position as shown in the drawing.



An easily built and safe tire hook

An Indexing Fixture for Floating Bushings

MANY ingenious methods have been devised for drilling the holes in floating rod bushings since they became popular on modern locomotives. The illustration shows a simple indexing fixture that is designed to fasten to the column of a vertical drill, and drill two rows of countersunk holes properly spaced on the circumference. The U-shaped frame of the fixture slides in ways on a base which is bolted to the column of the drill press. This permits lateral location of the holes. The frame supports a spindle and the spiders between which the floating bushing is secured. The spider nearest the operator has a series of holes



An indexing head for drilling floating bushings set up on a vertical drill

into which the stop-pin shown in the frame is inserted, thereby preventing the bushing rotating. A countersink drill is set in the spindle of the drill press.

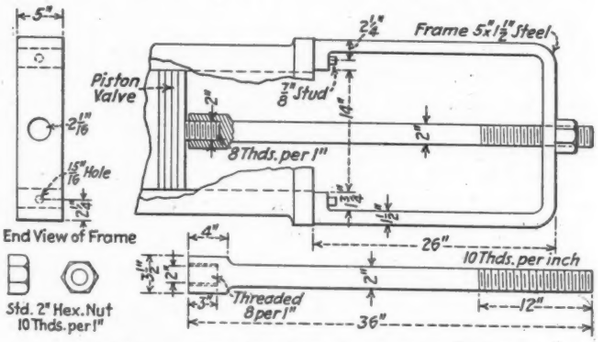
Reducing the Speed of Pneumatic Drills

SHOWN in the drawing is a speed reducing attachment for compressed-air drills which is comprised of a train of four gears. The pinion, which is driven by an air motor, is an eight-pitch, 14-tooth gear that in turn drives a gear of 28 teeth. To the shaft of this latter gear is keyed a 10-tooth pinion which drives a gear having 32 teeth. This gear is in turn keyed to the shaft on which is screwed a No. 5 Morse taper socket. The speed ratio of this train of gears is 6 to 1.

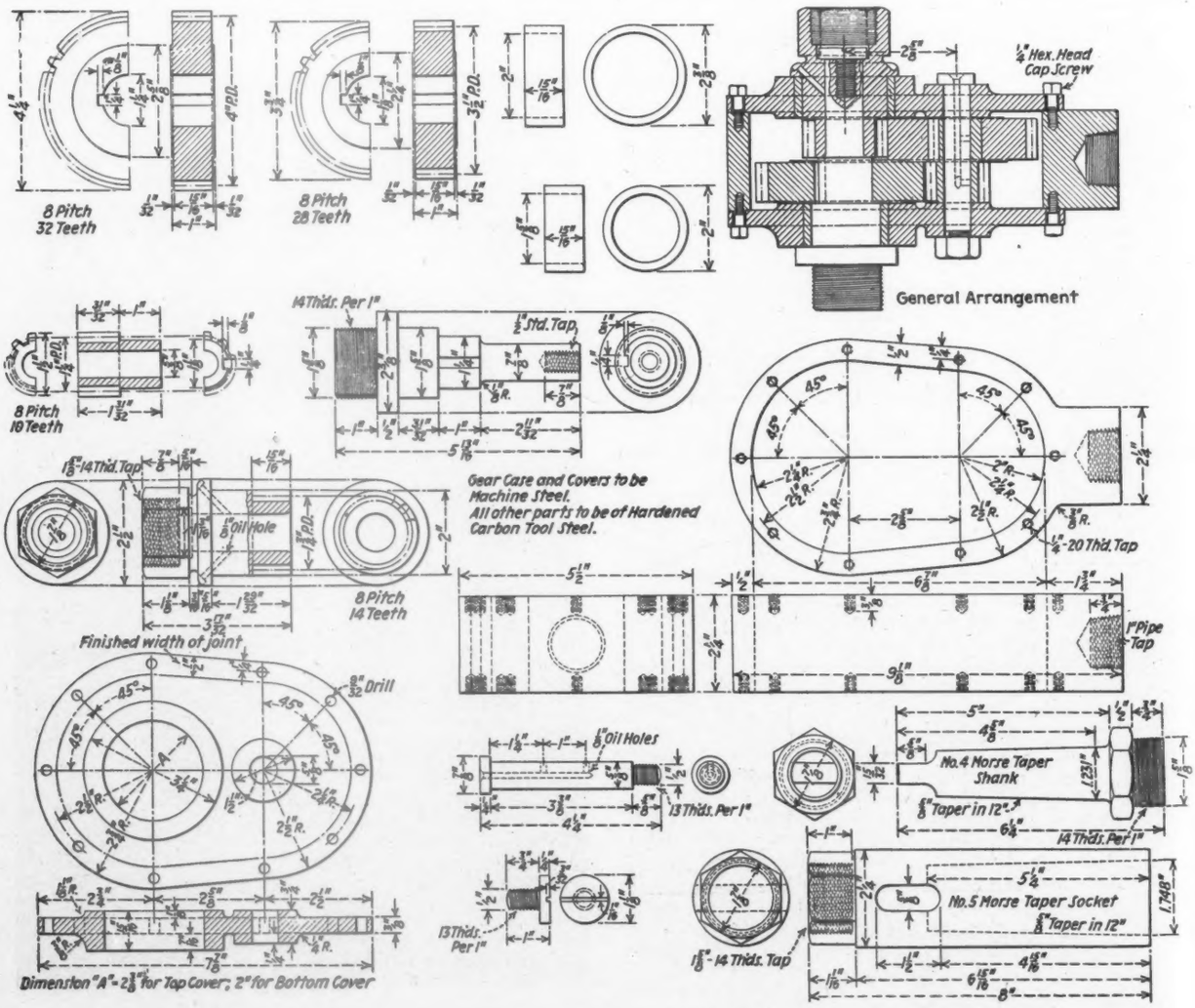
The attachment is driven by a motor fitted with a No. 4 Morse taper socket, which fits over a shank screwed on the shaft, and to which is keyed the 14 tooth pinion. The gears are lubricated by means of ⅛-in. oil holes drilled in the gear shafts. The gears are enclosed in a case, the dimensions of which are shown in the drawing. This case is made of machine steel.

A Piston Valve Extractor

THE removal of piston valves is often an arduous task, especially when the bullrings and the followers become incrusted with carbon. When this is the case, a puller such as shown in the drawing can be used to remove the valve. It consists of a 5-in. by 2½-in. steel yoke which is designed to bolt to the valve chamber and a 36-in. bar, threaded at one end for



Details and application of the valve puller



Details and assembly of the speed-reducing attachment for drills operated by compressed air

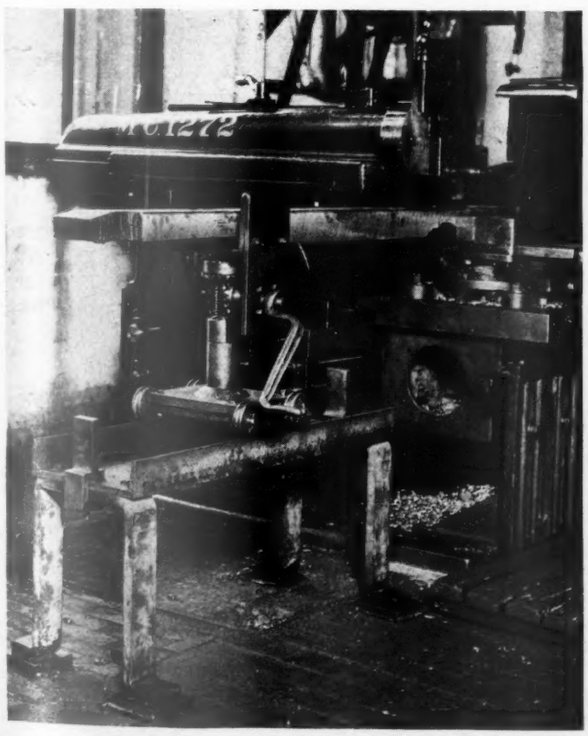
a distance of 12 in. and bored and threaded at the other end to fit the valve stem. Several such bars may be necessary, depending on the extent to which valve-stem threads have been standardized on the road using the extractor.

When using the device, the rod selection is made and the yoke bolted to the valve chamber as shown in the drawing. The rod is then inserted in the yoke and screwed onto the end of the valve stem after the valve stem nut has been removed. When the valve stem has been cut from the valve crosshead, the valve can be pulled from the valve chamber by tightening the 2-in. hexagon nut on the rod against the yoke.

Device for Machining Guide Bar Clearance

MOST methods used for holding guide bars level on a shaper table while cutting crosshead clearances usually consist of a roller mounted on a trestle for supporting the overhanging end of the guide. These methods frequently consume a considerable amount of labor and time for leveling the guide bar preparatory to machining it. After it is leveled, the taper on the top of the bar often throws the job out of line as it moves across the roller, because the shaper chuck is not of sufficient strength to hold the unsupported weight of the bar.

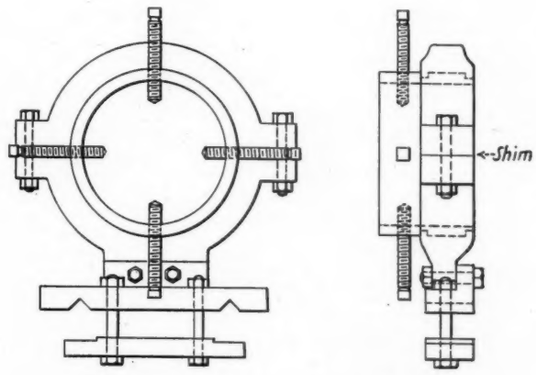
Because these difficulties were encountered in the B. & O. shops at Mt. Clare, Md., the device shown in the illustration was designed. It consists of an elevated channel which serves a runway for a small carriage on which is mounted an adjustable table which supports the guide bar as it is being machined. The guide bar is quickly leveled with this device which readily moves with the shaper table, thus eliminating the possibility of the free end of the bar dropping down and throwing the work out of line.



The adjustable table mounted on a carriage facilitates the machining of guide bar clearances

A Revolving Steady Rest for Guiding Square Stock

A REVOLVING steady rest by which it is possible to support a piece of square or irregular section for facing, turning or threading is shown in the drawing. The outer part is made from a locomotive eccentric strap welded to a suitable base made to fit the ways of the lathe. A steel ring, running in the groove of the strap, is made about 2 in. wider than the strap and projects this distance on one side. In this projecting portion of the revolving steel ring are four ⅞-in. centering screws which center the work and revolve with it and with the inner ring.



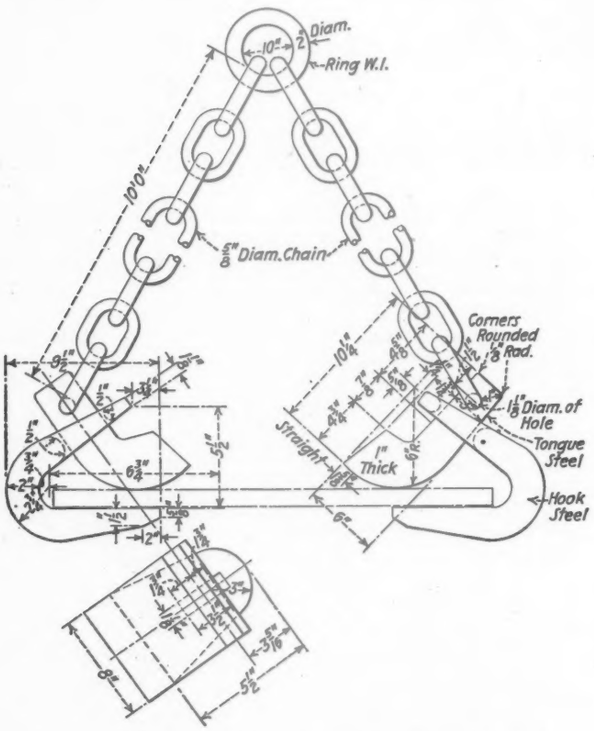
A steady rest with a revolving center

Such a rest is useful when the work cannot be supported by the tail stock center or by the ordinary steady rest. It can also be used in forming lathe center holes in square or irregularly shaped bars, and for machining work that extends entirely beyond the ways of the machine, necessitating the removal of the tail stock from the lathe.

Safety Hooks for Plates

THE plate hook shown in the illustration has a carrying capacity of 8,000 lb. and has been adopted by one road as standard equipment in its shops. Although the dimensions shown are for an 8,000-lb. capacity hook it is designed in smaller sizes for carrying loads of 2,250 lb., 3,000 lb., and 5,500 lb. The principal feature of the hook is the manner in which the 1-in. steel tongues holds the plate against the hooks as they are raised by a crane. This tongue, 3 in. thick at the point where chain is attached, fits into a 3½-in. slot in the hook and is free to slide until stopped by the attached chain or by the butt of the tongue which is 6 in. wide. The hook into which the tongue fits is 9½ in. high, is bent at an angle of approximately 45 deg. and has a mouth opening of 5½ in. The chain is made of

5/8-in. iron, is 10 ft. long and is suspended from a 10-in. diameter ring that is made from 2-in. stock.

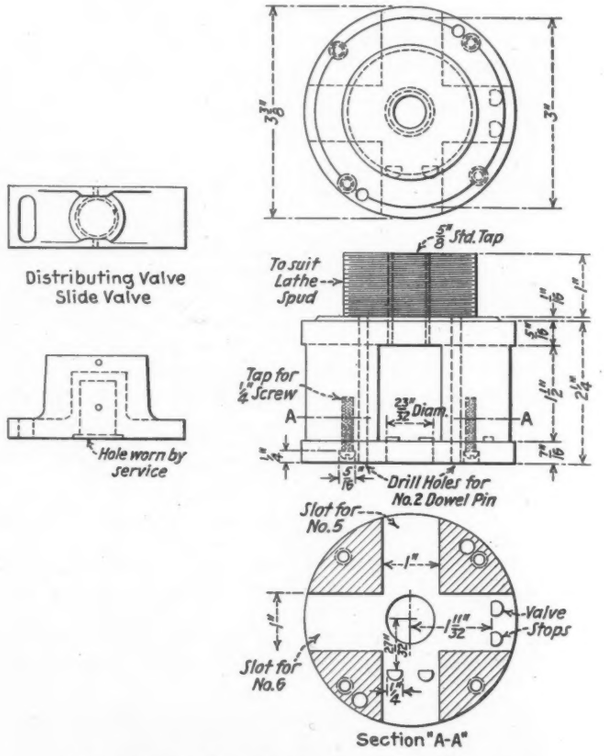


A safe hook for lifting plates—Capacity 8,000 lb.

When in use, the hooks are slid under the end of a plate and as it is raised the weight is supported by the chains attached to the tongues. As the weight is transferred to the tongues they slide in the slots and bind against the plate and the hook, thus holding the plate securely in place, preventing it from slipping or falling.

Bushing Slide Valves of Distributing Valves

BECAUSE the pin hole of a distributing-valve slide valve wears oblong after constant use, resulting in incorrect valve positions, it is often desirable to re-

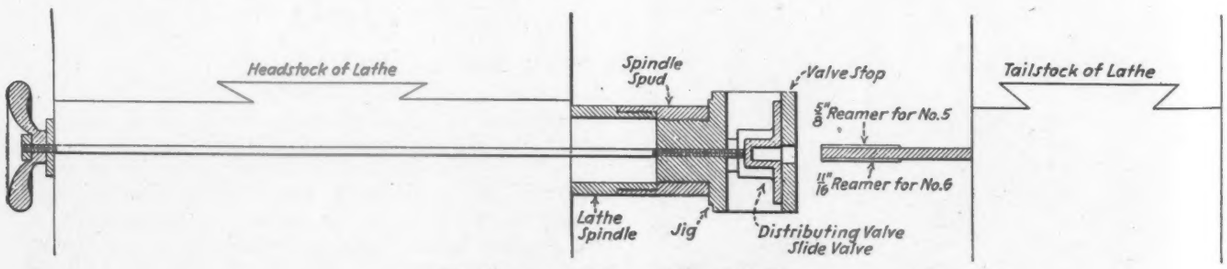


A jig for bushing distributing-valve slide valves

bush the valve. To do this without disturbing the valve seat requires the hole to be reamed perfectly square with the face of the seat.

The illustrated jig is one that can be used for bushing this pin hole without afterwards facing off the seat to make it square with the hole. All valves which are to be reconditioned are reamed the same size. No. 5 distributing-valve slide valves are reamed to 5/8 in. and No. 6 distributing-valve slide valves are reamed to 11/16 in. This is to permit the making of bushings in long tubes, cut to proper length, to be carried in stock.

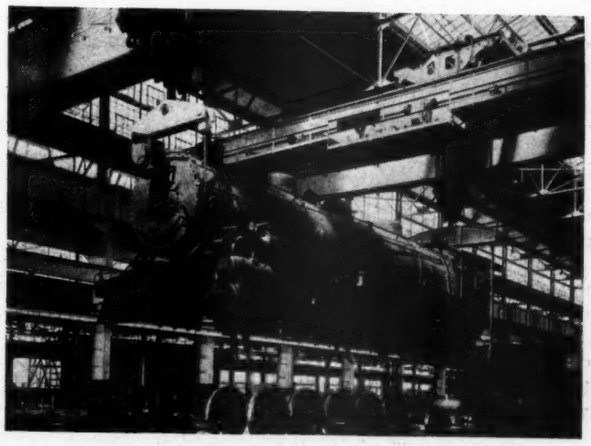
When bushing a slide valve, it is placed in one of the slots of the jig which is mounted on a lathe spindle, and allowed to come to rest against the stop pins shown in the drawing, in which position it is secured by the screw running through the spindle shaft of the headstock. In this position the valve is ready for reaming. When reamed, the hole will be square with the face of the seat because the slots are milled accurately and the body of the jig faced off after it has been placed on the spindle.



The jig mounted on a lathe spindle

Thus, when the hole is reamed it will be square with the face of the valve and, when bushed, will be ready for reassembling without grinding or spotting the valve seat.

NEW and IMPROVED MACHINE TOOLS AND SHOP EQUIPMENT



Developments in Machine Tool Design

THIS issue of the *Railway Mechanical Engineer*, the fourteenth annual Shop Equipment Number, marks the passing of another year in the development and refinement of machine tools and shop equipment suitable for railway shop utilization. The trend of machine-tool design has continued to be one of refinement, the most outstanding of which has been the extended use of alloy steel and heat-treated parts to increase durability. The use of anti-friction bearings has been extended and all latest designs of machine tools include flood, or full-automatic lubrication for all wearing parts. In most instances the lubricant is forced through the oiling systems by a motor-driven pump, oil filters of various kinds being incorporated to remove foreign matter.

A majority of the machines brought out during the past year have included heat-treated alloy, or high-carbon steel gears, spindles and, in fact, all parts subjected to wear and heavy stress. The use of anti-friction bearings has been extended to all types of machines. Spindles of grinding machines, milling machines, and drilling machines, as well as lathe spindles, have been mounted in anti-friction bearings. Practically all of the armature shafts of built-in motors are mounted in either ball or roller bearings.

Cutting fluid circulating systems have also been given considerable attention, the fluid being forced in many instances by a pump to a tank located at the top of the machine from whence the fluid flows by gravity to the cutting tool. Filter installations have been made in the fluid line to eliminate dirt and cuttings.

The use of multiple electric motors has been continued, each furnishing power directly for a single function, instead of a single motor driving through complicated gearing. Consistent improvements have been made in the application of push-button control for starting, stopping, jogging, traversing and feeding. Hydraulic transmission has been improved in a line of milling machines and added to other machines to operate feed and rapid traverse.

Developments in Railway Machine Tools

Few single-purpose machines have been brought out and attention has been given to the design of machine tools and attachments that will handle a great variety of work. This is particularly true of shapers and grinding machines. Special attachments have been developed for shapers that will enable existing tools to increase the scope of their work. Attachments for machining crossheads, driving boxes, stoker boxes, sprockets and keyways are included in this list. One car-wheel borer utilizes hydraulic feed and rapid traverse, while another has been designed to handle wheels with large diameter bores that accommodate roller bearings. Special cutting heads for car-wheel borers have also been designed with four cutting tools. These tools have been utilized to increase the speed of finish cuts. One wheel lathe has been placed on the market which is equipped with herringbone gears and which has hinged bearings to permit turning wheels with outside bearings. A 90-in. quartering and pin-turning machine has been brought out which has fewer gears and shafts to obtain the desired range of speeds.

Four milling machines especially adaptable to railway use were placed on the market during the year. These included a horizontal rod miller, a vertical rod miller, a shoe and wedge miller and one adaptable for use on driving boxes. Several automatic machines were brought out. One of these was an automatic chucking machine, the return of the tooling from all work at the completion of all machining operations being automatically effected through the rapid traverse of the ram. Another automatic machine was designed to thread long hex- and square-head bolts and bolts and screws having odd shaped heads. Advancements have been made in machines designed to make fitted bolts. Taper attachments have been added to turret lathes to speed up production of work of this nature.

Several improved types of planers, shapers and milling machines were introduced during the past year. The improvements made have been largely refinements, much attention being paid to location of controls for the convenience of the operator. In some instances dual control has been installed for this purpose.

Other Developments

During the past year there was considerable development made in the field of small tools, drills, motors, pipe threaders and cutters falling in this category. One of the most noted developments in this type of equipment was the adoption of rotary type mechanism instead of the reciprocating type for operating air hammers and drills.

In the field of grinding, one company has brought out machine attachments for improving the methods for grinding cylinders, side rods and valve-motion parts. Most of the grinding-machine manufacturers have increased the variety of sizes in their lines of standard machines.

The principal development in woodworking machinery has been the continuance in the refinement of safety devices to protect both the operators and the work. Anti-friction bearings are also being applied to this class of machinery.

The most noted development in material-handling equipment has been refinements in design. Anti-friction bearings and high pressure lubrication have been applied wherever possible to electric trucks and monorail cranes.

The increasing use of welding in the railway shops has resulted in the design of many portable electric-welding machines. The trend in the design of this type of equipment has been toward inherently-regulated single-operator machines. New machines for spot welding have also been developed.

There has been a distinct development made during the past year in various types of devices for the spray application of paints, varnishes and lacquers. One of these is electrically operated and another is equipped with a silencer.

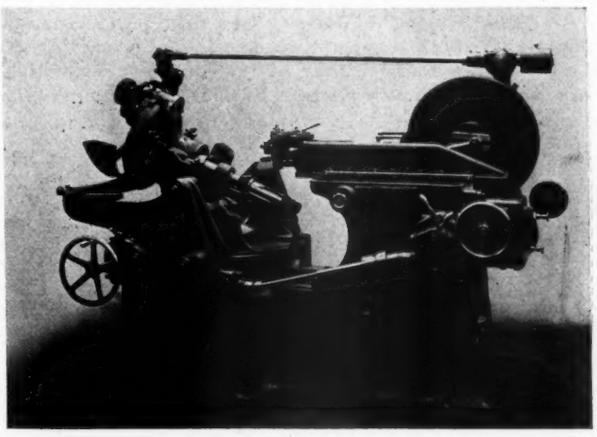
A Bevel-Gear Planer

THE George Scherr Company, 142 Liberty street, New York, is marketing the Reinecker bevel-gear planer shown in the illustration. The generator produces the involute tooth form by the self-generating principle, developing the tooth profiles exact in pitch and correct for each number of teeth. The tools consisting of a set of triangular-shaped planing tools, cut with their flat sides, generating the involute curve from a central position. The machine generates the tooth form in such a way that a plane crown gear (180 deg. pitch angle) is assumed, the tooth outlines of which are rectilinear flanks running to the apex. The cutting tool represents the tooth of such a plane gear and the gear to be planed unrolls automatically on the assumed crown gear. On this method the planing of straight as well as spiraloid beveled gears is based.

The standard pressure angle is 15 deg. If other pressure angles are desired, these can be produced either by means of special tool holders or by a special method of correction. The tools are sharpened in a simple fixture on the face only. One set of tools is sufficient for planing any number of teeth and one set of three tools will produce a large number of pitches.

The gear blank to be cut is indexed from tooth to tooth after every stroke of the machine. In this manner the gear is evenly heated over the entire circumference and the wear of the tool is evenly distributed over all the teeth in the gear.

The bevel-gear generators are made in four sizes, Nos. 0, 1, 2, 3 and 4. All sizes excepting the No. 0, have single-pulley drives. All feed and speed changes are obtained by gear boxes operating from one position.

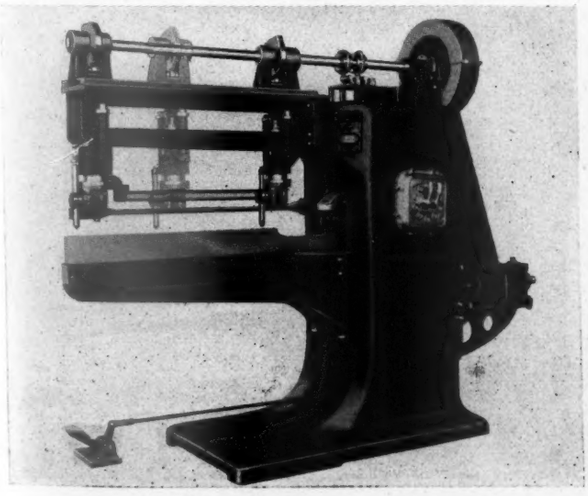


The Reinecker beveled-gear generator

The sizes Nos. 2, 3 and 4 have an adjustment in the ram handle to increase their range, especially on pinions integral with long shafts.

Multiple-Head Welding Press

THE illustrated multiple-head welding press has been developed and patented by the Thomson-Gibb Electric Welding Company, Bay City, Mich. This equipment can be compared with the multiple-spindle drill press. Practically any number of spot welds can be made at one time without removing the work. A number of individual welding heads can be applied to a machine, the heads being adjustable so that spots can be made as close together as one inch if so desired.



The Thomson-Gibb multi-head welding press

The welding heads do not operate at the same time but they operate simultaneously in rapid succession and, with one revolution of the machine's flywheel, as many spots or series of spots are welded as there are heads. The press welder is also suitable for projection welding. Electrodes can be bar sections instead of points, each bar section making two or more projection welds at each stroke. These bar sections can also be used for cross-wire welding

The secondary loop is the same for each welding head, regardless of its distance from the transformer, inasmuch as the secondary is carried to the farthest head first and then carried back to each succeeding head. With this type of construction one transformer heat regulator is all that is necessary for a machine. The machine is equipped with four speed-change gear boxes, affording various speeds from about 10 to 15 r.p.m. up to approximately 100 r.p.m.

The T-G Multi-head press welder is constructed and operates like the Thomson-Gibb electric welding presses which are, in reality, combination spot welders and punch presses. An entirely new principle is employed in that where spots are normally made in one second the welding press makes spots in a fractional part of a second. This is accomplished by means of an especially designed water-cooled transformer and a timed automatic switch. The transformer in its action has the characteristics of a condensor.

The object of this principle, aside from speedy opera-

tion, is to minimize depressions on the surface, warpage and discoloration. The weld is made before the heat has an opportunity to soften the outer surface of the sheet.

Improved Driving-Wheel Lathe

THE 90-in. locomotive driving-wheel lathe shown in the illustration, a product of the William Sellers & Co., Inc., Philadelphia, Pa., has been made heavier than previously built Sellers' wheel lathes. It has herringbone gears in the driving train and hardened and ground steel wear plates.

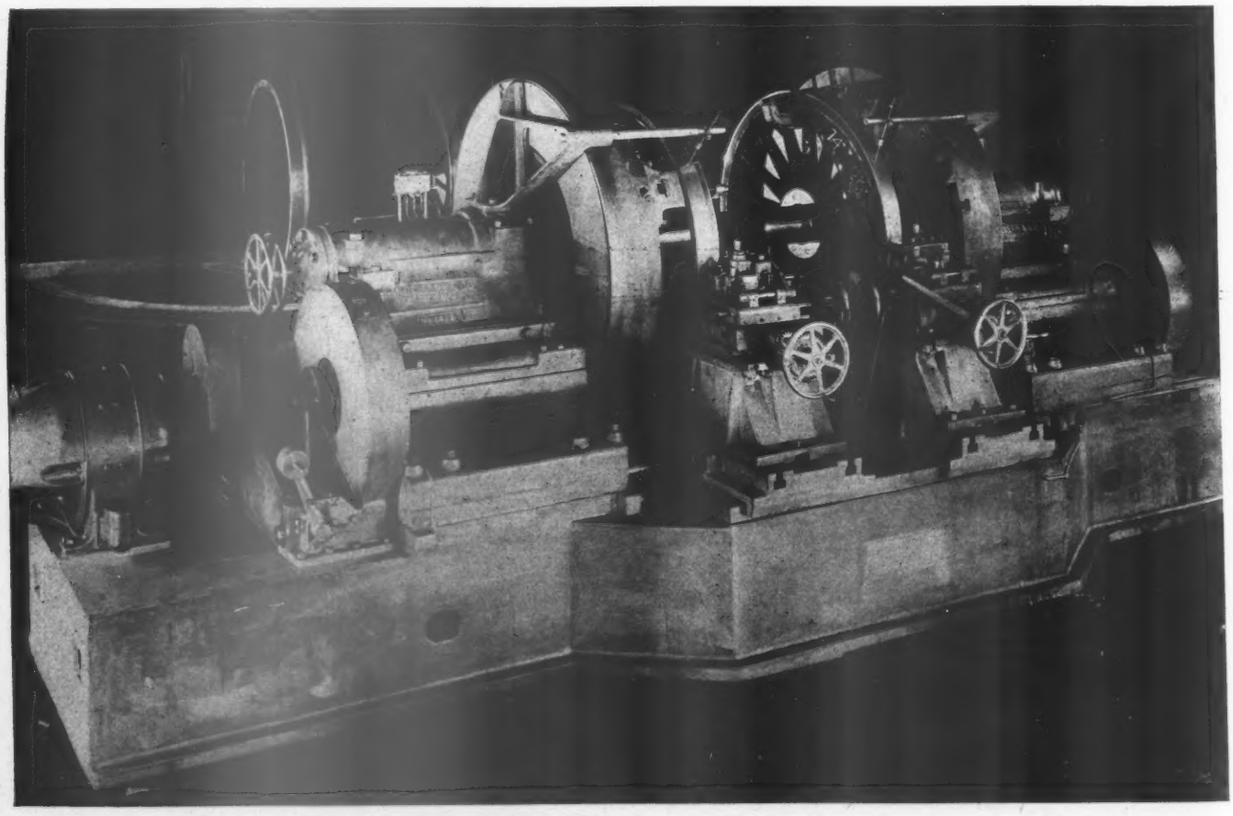
The centers are 46 in. above the bed. The actual swing of the machine over the bed is 90 in. and it can handle wheels ranging from 38 in. to 88 in. in diameter on the tread. The maximum distance between the face plates is 9 ft. 8 in., the diameter of the sliding spindles, 7 in., and the length of the sliding spindle, 3 ft. 10 in. The thickness and diameter of the face plates are 14 in. and 7 ft. 6 in., respectively. The machine has five feeds: ⅛ in., ¼ in., ⅜ in., ½ in. and ⅝ in. per revolution of the face plates.

The machine has two compound slide rests, each carrying a turret tool holder taking four tools, the full complement of roughing and finishing tools. The tool slides have hardened and ground steel shoes oiled from pockets in the slides. It is equipped with a set of patented self-tightening drivers, two on each face plate for chucking standard types of driving wheels and trailer wheels.

The bed is of heavy box construction made from cast iron and is 66 in. wide under the heads, 7 ft. wide between the face plates, 36 in. deep and 26 ft. 10 in. long. The headstock bearing is 5 ft. 9½ in. wide and 54 in. long and is securely bolted to the bed. The gearing between the motor and through shaft is carried in this head. The face plates are designed with circular walls tied together by a number of heavy radial ribs. The gear ring on the face plate is made separate and is of semi-steel, 9 in. wide, with internally cut teeth.

The bearings supporting the front end of the spindles are hinged to facilitate setting up the lathe for trailer wheels with outside journals. The cast-iron tool posts, weighing 6,000 lb. each, carry the tool slides and are adjustable along the rails for various diameters of wheels and carriers. The base plate upon which each post is carried measures 34 in. wide on the bed.

The slides are arranged to swivel on the post the required amount to turn the taper treads on the tires. The top slide carrying the turret is 17 in. long and 16 in. wide. Contrary to usual practice, the top slides move longitudinally, but they are nearest to the cutting point of the tool which permits a rigid construction. The turret type tool holders are locked by a patented mechanism consisting of two cams which, upon being moved into place, tend automatically to complete the



The Sellers 90-in. driving-wheel lathe

lock. The tools are so arranged on the turret that when it is revolved for successive operations, the proper tool is brought into the position for starting the cut with a minimum adjustment of the slides.

There are only two drivers on each face plate which are self-tightening. They have side adjustment and can be moved to take care of any number of spokes and are designed to hold the wheels with a power which increases with the resistance of the cut without producing any thrust on the face plates or wheel rims. The end thrust is taken through the center of the spindle and not on the face plate and hollow spindle. It is transferred to an amply supported thrust bearing of hardened steel in the cap back of the heads.

In chucking the wheels, the right head is moved back far enough to allow the wheels to be entered and set in relation to the fixed head. The adjustment head is then moved up through a friction slip clutch which regulates the amount of initial pressure upon the centers.

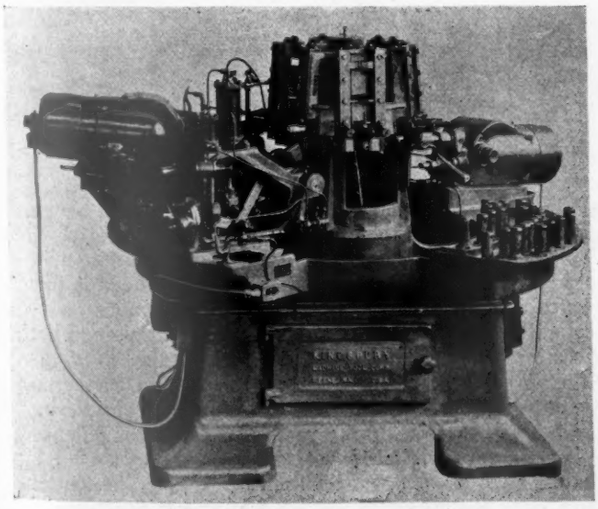
When arranged with a d.c. drive, a 50-hp. shunt-wound adjustable-speed motor having a speed ratio of 3 to 1 is used, the motor, connecting directly through gearing, gives face-plate speeds ranging from .506 to 1.518 r.p.m. The speed change is obtainable from the motor control. When arranged with a.c. drive the main motor is a 50-hp. slip-ring type having a speed of about 1,150 r.p.m. A speed change box is provided through which the motor drives, giving 12 face-plate speeds, the minimum of which is .365 r.p.m. and the maximum 1.565 r.p.m., changeable by gearing. The gear ratio between the motor and the face plate is 1,000 to 1. The main shaft, 6 in. in diameter, is driven from the motor to the headstock through a train of gears and jack shaft to the internal gear on the face plate, the main shaft extending past the tailstock to which it is connected through a double train of gears and jack shaft, to the internal gear of the tailstock.

All important bearings are oiled from specially located tanks which hold a day's supply of oil and which are provided with a gage to show the quantity on hand. A single valve on each tank opens all the pipes connected to that tank and starts the oil into the various bearings. Each pipe is provided with a special feed valve just below the tank allowing a regulation of the flow and a view of the quantity of oil that is being fed.

The herringbone gears used in the Sellers driving-wheel lathe

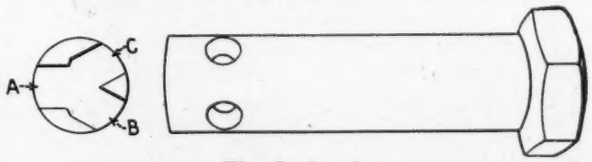
Kingsbury Machine for Drilling Cooke Pins

THE machine shown in the illustration is the product of the Kingsbury Machine Tool Corporation, Keene, N. H., and is designed for drilling the Cooke self-opening and self-retaining pin which is marketed by the American Railway Products Co., 74 Washington street, South Norwalk, Conn. The pin has been adopted as standard equipment on locomotive tender and passenger car clasp brakes manufactured by the American Steel Foundries and on the locomotive, foundation, driver and trailer-truck brakes of the American Brake Company.



The Kingsbury machine for drilling Cooke pins

The machine is provided with an automatically indexing turret and three Kingsbury No. 30 automatic drilling heads. Chips and coolant fall through the open table center into a chip pan inside the cabinet base,



The Cooke pin

which is open at the rear to permit the removal of the pan.

The turret indexes to the left. Hole *A*, referring to the drawing of the pin, is drilled at the first head located beyond the loading station. This head has a spindle extension which passes through the turret base and drills the hole from inside the turret. In order to clear the pins on the side of the turret nearest this head, the spindle extension and head are placed on an angle of

5 deg. with the machine table. The pins are, therefore, placed in the turret on a 5 deg. angle with the turret axis.

The pins are clamped in V-blocks, the screw of which is operated by a detachable wrench. This screw, which is placed some distance above the end of the pin being drilled, will not take the thrust of the inside drill when drilling hole *A*. At this station, therefore, an external clamp lever is used. An air cylinder acting through toggle levers operates the clamp lever. This mechanism is designed as an individual unit.

Holes *B* and *C* are drilled at two heads located at subsequent working stations on the machine table. These heads are mounted on angular adapter plates so that the three drilled holes will be in the same plane; i.e., square with the axis of the pin. To prevent the converging point of the center lines of holes *B* and *C* varying with respect to the turret center when drilling different diameter pins, these two adapter plates are adjustable on the machine table.

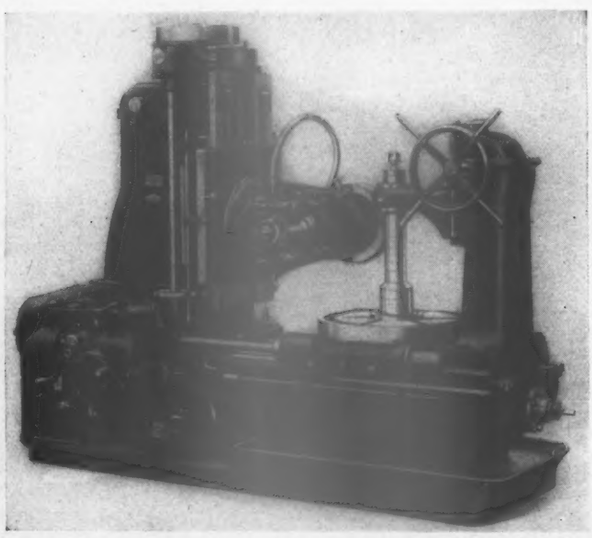
Each turret station consists of a fixed V-block in the lower position and two V-blocks adjustable vertically to gage the pins from under the head. These blocks slide in vertical ways, carried on two threaded studs. Small pinions are pinned to the upper end of these studs and block adjustment is obtained by meshing a pilot gear with the pinions.

Automatic indexing of the turret is obtained by means of a Geneva mechanism operated by a motor-driven friction clutch inside the cabinet base. Synchronization of the turret index, lever clamp and spindle stroke is obtained by compressed air through a series of regulating valves, enabling the operator to run the machine either full or semi-automatic. When operation is semi-automatic, the turret will not index until the operator trips the control valve. When operating full automatic, obtained by leaving the control valve in the *on* position, the turret indexes as soon as all spindles have completed their strokes and returned to their starting positions. Upon completion of the index, further motion of the Geneva shaft opens a valve to the clamping cylinder. The motion of the lever clamping the pin and locking the turret opens the trip valve to the drilling heads. The spindles cannot feed when the turret is not in the locked position and the turret will not index until all drill spindles are in their returned position.

Automatic Gear-Hobbing Machine

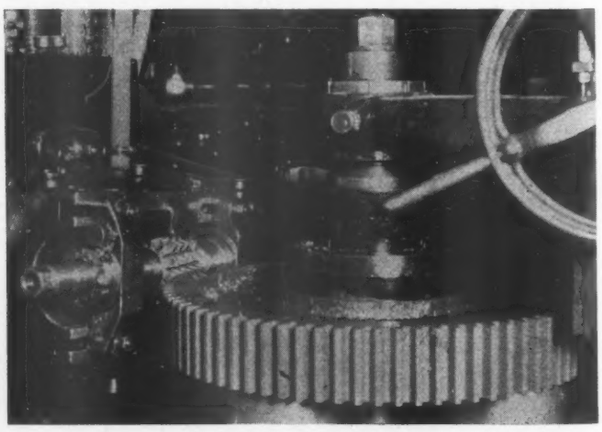
THE gear hobbing machine, a product of Schuchardt & Schutte, handled by George Scherr Company, 142 Liberty street, New York, is designed to generate either a single gear or a group of similar gears entirely automatically in one continuous operation. The teeth of the gear are not cut one by one but are all started during one uninterrupted revolution of the work table and gradually finished while the hobbing cutter is fed downward or the table fed towards the hob as in the case of worm wheels.

The bed of the machine has planed ledges on its bottom and is of rigid design and reinforced by specially



The Schuchardt & Schutte gear-hobbing machine

arranged ribs. The column of the machine is firmly bolted to the bed and accurately held in position by tapered dowel pin. The vertical shaft inside the column turns in two stationary and one traveling bearing, all of which are equipped with ball bearings. A detachable hood, covering the opening on the top of the column, prevents the penetration of dirt into the interior of the machine. The cutter-arbor drive is geared to the shaft



The cutter in operation

of the sliding gear box by means of shafts and beveled gears. Speeds of the drive can be varied to give the hob the most suitable cutting speed, six variations within wide limits being provided. The cutter head is fixed securely to the cutter-head slide, which moves on the vertical column, and can be swiveled on this slide in both directions to 360 deg. A graduation reading to 90 deg. either way and a vernier scale are provided for setting the cutter head accurately to one minute on any desired angle. The weight of the cutter-head slide is balanced by a counter-weight of half its weight suspended by chains running over a differential roll. The cutter-head slide moves on wide, flat ways and is fitted with adjustable tapered pressure and slide-cover gibs.

The cutter spindle which carries the cutter arbor with the hob is equipped with a heavy fly wheel which insures by its momentum a uniform cutting of the hob in case of intermittent and irregular resistances caused during the cutting process by hard places in the material or by hobs not ground to run true. To prevent a transmission of jerks and jolts to the interior of the machine, two more fly wheels are fitted in the inside of the column of the hobber on the vertical shaft at suitable places, while a fourth fly wheel is mounted on the top of this shaft above the column. This arrangement of fly wheels renders it possible to suppress the chattering and the vibration while the machine is in operation and it also minimizes the load variation which is often thrown on the motor.

The cutter head encloses the hob to half its diameter, reducing the overhanging of the center of the cutter arbor from the ways of the column to a minimum. The main-cutter spindle bearing is adjustable to a scale and vernier by means of a rack and pinion. The cutter-head slide has quick power travel in both directions in addition to standard feed motions.

The work table turns in V ways and is supported by a flat way close to its outside rim and is guided by a long and rigid cylindrical trunnion. The table carriage and table have, in addition to both hand and power feed, quick power travel in both directions. Micrometer dials are provided to facilitate accurate adjustment.

The differential and feed-gear box is located at the operating side of the machine and contains all members for the transmission of the movements. It encloses the differential gear which accelerates or retards the rotation of the table for cutting spiral gears and which is also required for the production of worm wheels by means of the tangential feed head. Owing to the independent arrangement of the differential gear, no change of feed or number of teeth of the spiral gears cut will affect any predetermined tooth angle. Conveniently located levers serve for controlling the vertical and horizontal feeds and for operating all movements of the work table and table carriage as well as of the cutter head slide. The levers actuating the feed and quick power travel are interlocked and fool-proof. At the rear of the differential gear-box a dividing change-gear quadrant is located on which are mounted those dividing change gears which are necessary for the particular number of teeth of the gear to be cut. On the front side of this gear box a quadrant for mounting the differential change gears is located. Both quadrants are protected by hinged cast-iron boxes.

The largest part of the driving elements of the machine runs continually in a bath of oil supplied from a large oil pocket, cast as a part of the differential and feed-gear box, which is continually kept supplied with oil by a special pump. A large spout is arranged to spurt coolant on the hob independent of the position in which the cutter head has been swiveled.

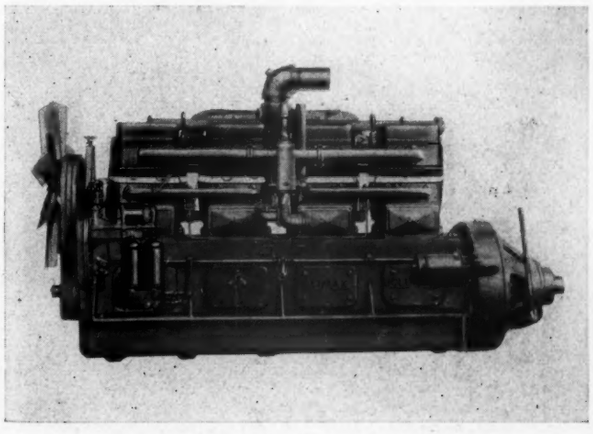
These machines when equipped with differential attachment will produce spur, worm and spiral gears with involute teeth. When special hobs are employed the machines can be utilized for cutting special profile gears such as stub-teeth gears, sprockets, ratchet gears and teeth of circular saws.

Climax Eight-Cylinder Gas Engine

THE Climax Engineering Company, Chicago, has completed the development of a straight eight-cylinder, valve-in-head gas engine, designed for use as the prime mover in gas or oil-electric industrial locomotives and rail-car equipment. In addition, this engine is being incorporated as the power unit in locomotive cranes and stationary applications, including generator and pumping service. This engine is provided with equipment making possible the burning of distillate fuel of 36-deg. to 40-deg. Baume and costing about half as much as gasoline. Mean effective pressures of 90 lb. per sq. in. are said to be attained, with power, flexibility and fuel consumption comparing favorably with those available when burning gasoline in industrial engines of conventional design.

All of the outstanding characteristics, including flexibility and durability, of the Blue Streak series of gas engines manufactured by the Climax Engineering Company are said to be incorporated in the new model. Valving, spark plug location and flame travel are controlled to secure low detonating values and unusually smooth operation with high power output. The engine, known as the R-8-I, has 6-in. cylinders with 7-in. stroke and develops more than 200 hp. at 1,000 r.p.m. and 225 hp. at 1,200. The torque curve peaks at 600 r.p.m., giving approximately 1,145 ft. lb. It is designed to deliver 100 lb. of brake m.e.p. at normal recommended speeds, and the fuel rate is under 0.6 lb. per brake hp. hr., burning gasoline. In addition to gasoline and distillate, the engine can also be operated efficiently burning natural gas.

Force-feed lubrication is employed, three oil pumps being provided to handle the lubricating oil from the end and main supply sumps. A duplex oil filter is used, all oil being carefully filtered before going to the bearings. A special oil strainer is provided to clean the oil entering the overhead valve system.



Climax R-8-I gas engine designed for railway service

Ample cooling is taken care of by a large centrifugal water pump. The water enters at the top of the cylinders, passing up through the distributing parts in the head, around the spark plugs, between the valve pockets

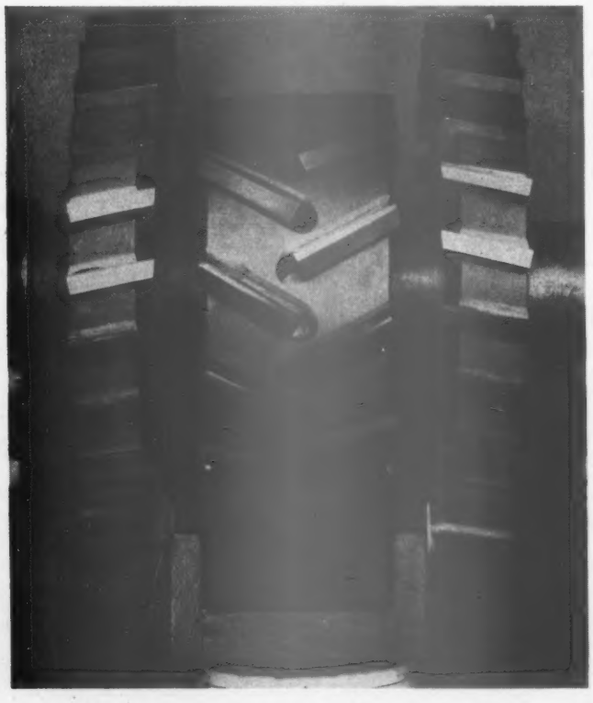
and combustion chamber, to the water outlet manifold. An eight-blade, 36-in. fan, with triple V-belt drive, is incorporated in the design, with mountings for tachometer, fuel pump and other forms of accessory drive.

The motor is equipped with two 2-in. Zenith carburetors, governor, magneto and dual ignition. Two Leece Neville motors, one on each side of the engine, are used for starting purposes.

Goddard Milling Cutters

IN the illustrations are shown two milling cutters which are now being manufactured by the Goddard & Goddard Company, Inc., Detroit, Mich. The one is a set of straddle milling cutters 17¼ in. in diameter for milling the outside of shoe and wedge flanges, with a center cutter 12¾ in. in diameter by 6-1/32 in. wide for milling the inside shoe or wedge face. The cutters are built on the serrated-blade principle, which increases the rigidity within the cutter itself through increased frictional bearing contact of the blade in the body. Serrations on the backs of these cutters and the large area of the flat wedge increase the bearing for gripping area on the blade about 67 per cent over the older design of cutters manufactured by this company. The blades may be set out longitudinally, parallel to the serrations, as decrease or lack of face or side chip clearance necessitates. They may be also set out radially, serration by serration, as lack of peripheral chip clearance requires.

The other cutter is a cone-type facing cutter with inserted serrated blades for applying directly to the spindle nose of a machine. The serrations are normal to the line of greatest cutting thrust to preclude any movement of the blade due to this cause. The blades may be set out, serration by serration or more, as wear requires. This set-out is directly opposite to the line of greatest wear. Cutters of this design equipped with high speed steel, stellite, or tungsten carbide blades may be furnished.



The Goddard shoe and wedge milling cutters

The Goddard cone-type facing cutter with serrated blades

"She" is a "He" Now

Half a mile, three-quarters of a mile, even a mile or more away is the end of *his* long train. For, with tremendous power *he* can easily pull 100 loaded cars uphill. Moving heavy loads at surprising speed, *he* personified dependability, service, promptness and progress—qualities which make a railroad.

When the Northern Pacific placed these sentences, descriptive of its new four-cylinder 2-8-8-4 locomotive, on the back of a pictorial post card, its advertising department chose to refer to the engine in the masculine, discarding the time-honored habit of railway men of placing motive power in the feminine category. Northern Pacific officers declared that no railroader ever thought of referring to his locomotive as anything but "she" or "her." But the copy-writer stuck by his convictions that such a massive piece of machinery typified the masculine rather than the feminine gender—and not without some precedent. Rudyard Kipling, in "The Days Work," referred to the locomotive, ".007," the principal character in one of the tales, in the masculine. A number of American literary authorities were consulted. While opinions differed, with some leaning to the neuter gender, the majority preferred the masculine. A professor of English at Amherst College replied, "Locomotives are not sex-conscious. * * * By all means let us have more he-locomotives."

Hisey Buffing and Polishing Machine

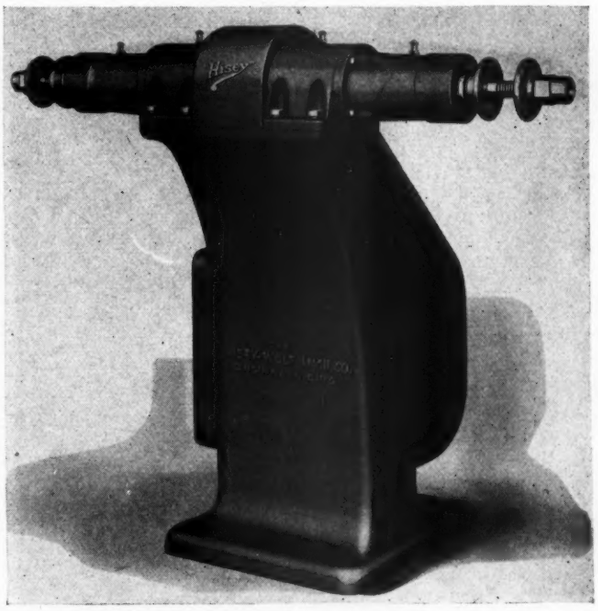
THE Hisey-Wolf Machine Company, Cincinnati, Ohio, has placed on the market a buffing and polishing machine which is designated by its manufacturers as the Texdrive Model M. The gooseneck base is a one-piece casting designed to eliminate vibration, to give the operator ample freedom of movement and to enable him to stand close or sit comfortably at the machine where the nature of the work permits him to do so. The spindle is made in one piece of nickel steel machined to exact diameter to insure perfect balance. Two ball bearings are provided for each end of the spindle, but Timken roller bearings can be furnished to order. The buffing wheels are secured by a Tobin bronze nut furnished with flat-top threads. The spindle and buffing wheels extend out from the base of the machine to permit the easy handling of large or odd-shaped pieces.

The bearing boxes are keyed to the column along the entire base of the bearing housing, the key fitting into the keyway on the top of the column. This keyway arrangement is to insure realinement of the bearing housings whenever they are removed and reapplied. Dust covers on each end of the bearing housings are provided with labyrinth seals to prevent dust and dirt from getting into the bearings.

The motor mounting is of the external type with a rigid four-point support. The motor is equipped with ball-bearings and has a dove-tailed sliding base, including a gib with necessary locking screws. A hand-wheel and feed-screw adjustment is used to secure the proper belt tension and accurate alinement of the motor. Tex-Rope drive is used for power transmission to the spindle.

Different spindle speeds can be secured by changing the motor pulley. The design of the machine makes it possible to change the belt without pulling the spindle through the bearing housings since, by loosening four bolts on each side, the entire spindle assembly may be removed from the machine.

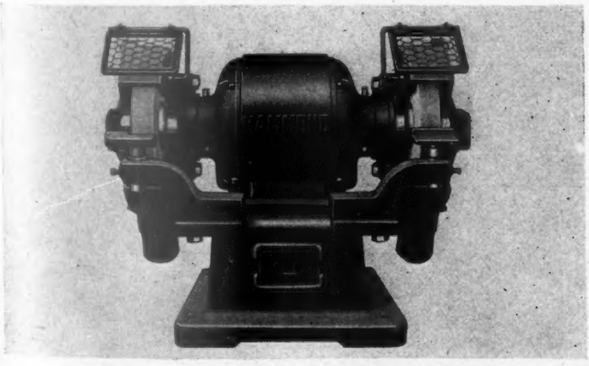
The oiling system consists of lubrication chambers which are filled through conveniently located cups. Gages are used to allow excess lubricant to escape through an overflow and drain plugs are used to permit quick flushing of the bearings.



The Hisey Model M buffing and polishing machine

The Hammond Bench Grinder

THE Hammond Machinery Builders, Kalamazoo, Mich., has recently placed on the market a bench-type of grinder designated as type W and made in two sizes of 1½ hp. and 2 hp. capacity. This machine is designed as a general purpose tool and light production grinder and is identical in construction with the larger Hammond grinders.



The Hammond W bench grinder

The motor is totally enclosed to eliminate possible injuries from accumulation of dirt, dust and emery. It is the 40-deg. centigrade rating, especially designed for grinder service, built in accordance with the National Electric Manufacturers' Association and capable of withstanding overload 100 per cent beyond its rated capacity. Push-button control is mounted on the pedestal, and a Cutler-Hammer automatic motor starter which protects the motor from overload, low voltage and phase failure is mounted inside of the pedestal. The chrome-nickel-steel shaft, which is oversize, floats in oversize ball bearings which are protected from dirt and grit by means of a double-labyrinth seal.

Standard equipment includes universal adjustable steel wheel guards which can be adjusted to compensate for the wear of the wheels, at the same time maintaining the same distance between the wheel and the guard. Exhaust outlets are furnished as part of these guards for convenience of attaching to an exhaust system. Oil cups with oil-level gage and flushing plug are supplied.

The single-phase machine is supplied with a conden-

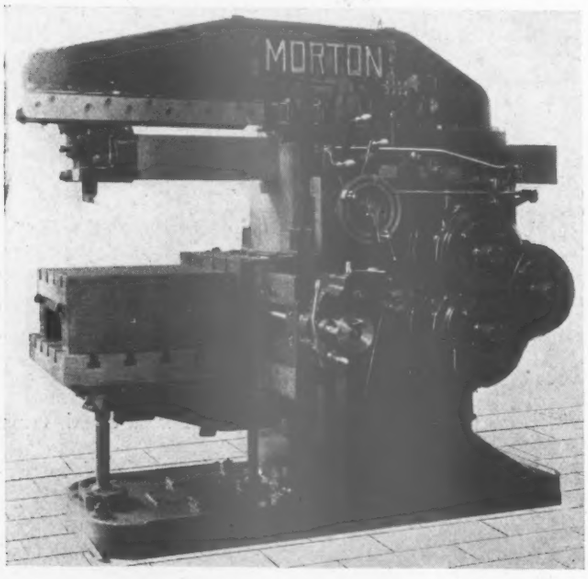
ser-type motor, having the same general characteristics as that of a power-line motor, capable of starting under heavy load and withstanding excessive overload. It is of solid rotor construction and has no commutators.

Shatterless glass eye shields offer protection and convenience to the operator, and pedestals of unique design give maximum foot room.

These machines are furnished for 110-, 220-, 440- and 550-volt, 1-, 2- or 3-phase alternating current and for 110- and 220-volt direct current service. Supplied in both the bench and floor types, the 1½ hp. machine has a 10-in. grinding wheel with a 1½-in. face and the 2-hp. machine a 12-in. grinding wheel which has a 2-in. face.

Draw-Cut Shaper and Crosshead Planing Attachment

THE Morton Manufacturing Company, Muskegon Heights, Mich., has added to its line of products the illustrated draw-cut shaper with an overhead extension ram-cap bearing and a screw-type outer support. This shaper is designed to insure extreme rigidity, to eliminate all spring or deflection of the ram irrespective of the length of the stroke and to insure perfect alinement of the table and work at all times.



Morton single-purpose draw-cut shaper

The overhead ram-cap bearing is of box ribbed construction. With this particular construction, the front or operating side of the machine is open on three sides to permit the operator to stand in the most advantageous position for setting and removing work.

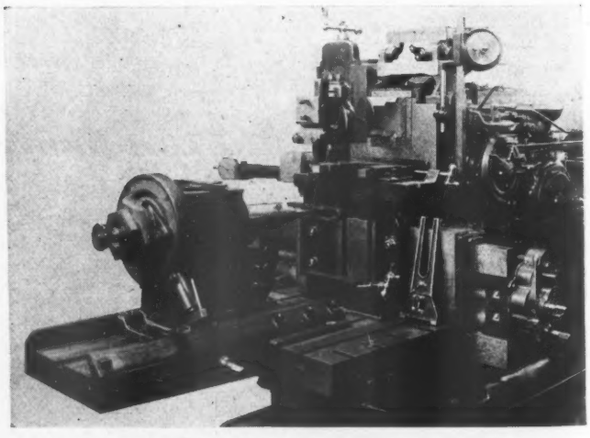
The tool head has an adjustable taper bearing, forming a support to the cutting tool, both top and sideways. It is fitted to the threaded end of the ram and may be held at an angle when desired by a quick clamping device. It is provided with a radially adjustable bearing above the cutting tool and with a wedge-taper bronze gib for compensating for wear. The bearing against which the head operates is made of special metal and so fitted to the extended ram-cap bearing that it may be removed and refitted should the occasion arise. Rapid power traverse, both horizontal and vertical, are standard in this machine.

This company has also brought out a draw-cut shaper attachment which is designed to meet all crosshead-planing requirements and which is applicable to Morton 38-in., 48-in., and 60-in. high-duty draw-cut shapers.

The base is a heavily ribbed casting and is designed to bolt to the lower table of the machine. It is relieved on the inside end to permit the maximum swing of the largest crossheads. The headstock is fitted to slide on the base and is provided with a rack and gear for moving it. It forms the journals for the arbor on which the crosshead is centered. When the crosshead is mounted on the arbor it can be rotated to the proper cutting position by means of a worm and gear but can also be unlocked so that it can be rotated by hand. The headstock is planed and slotted to receive special gages for setting the work.

The arbor is closely journalled in the headstock and forms the support for the crosshead. It holds the crosshead central from the tapered piston-rod hole and is so designed that it is self-adjusting to any inaccuracy in the taper. Two self-adjusting mandrels are furnished to take in the entire range of sizes and tapers used.

A special back bearing which bolts to the saddle of the machine is provided. It is readily adjustable, both horizontally and vertically, and transfers the cutting strains to the column of the machine. The crosshead is set for planing parallel with the center line of the crosshead pin hole by means of a leveling attachment on the machine.



The Morton attachment for planing crossheads

THE SOUTHERN PACIFIC is operating a "Better Health" car over its system to educate employees to care for their health. The car is equipped with X-ray apparatus and laboratories for physical examinations and for the testing of milk and water. Motion-picture machines with sound reproduction have been installed to project films devoted to nutrition, teeth, posture, blood transfusion, first aid, food and other subjects of health.

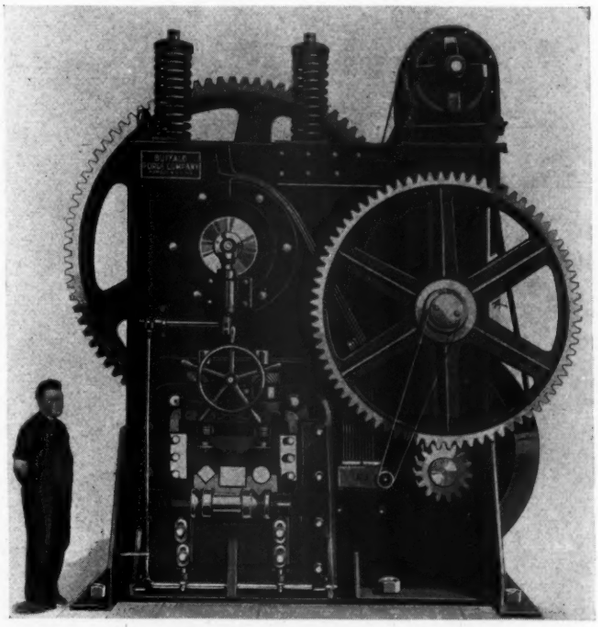
Buffalo Billet Shears

IN the illustration is shown the Buffalo No. 15 billet shear recently placed on the market by the Buffalo Forge Company, Buffalo, N. Y. It is of heavy armor-plate construction, the high-carbon-steel plates being joined together by arc welding heavy bars between them. These bars run the full length of the frames on either side of the plunger and are welded along all four edges, all welded sections being held in tension. This is accomplished by running alloy-steel studs through both frames and stiffeners in the rear. These studs pass through slits in the plunger near the knives to overcome any tendency of the frames to spread. In addition to welding the frame, heavy discs are welded to the rear frame, which is lighter than the front frame, at the points where the main and intermediate bearings are located. The knifeholder, which is a one-piece steel casting with the stripperholder, is also welded to the frame, as are also the brackets.

The ram is an alloy-steel casting, the end of which engages the plunger in a hardened tool-steel seat, heat-treated for maximum wear. The plunger is counter-balanced and is adjusted by means of two jibs, one on either side, to facilitate the centering of the knives. The reaction in shearing is taken up by two bronze guides behind the plunger. The knife seats in the plunger, front frame and knifeholder are lined with hardened tool-steel pieces of an area considerably in excess of that of the knives, to prevent the pounding down of the seats.

Six splines at the end of the eccentric transmit the power from the main gear clutch. There are no inserted keys. Clutch and gear jaws are faced with interchangeable hardened tool-steel pieces and thrust is taken care of by an adjustable bronze washer. The intermediate and oil-ring bearings are both inserted in the frames and not mounted in separate overhung cast-iron housings. The outboard bearing is a self-alining roller bearing.

The forced-feed oiling system is used for all bearings, as well as the slide and other moving parts. The machine may be tripped by hand or feet or locked to operate continuously. The stripper, reaching close to the knives, is designed to permit using up material to the last end without undue waste. There is also an adjustable guide roller and the machine can be furnished with a tilting gage. As a safety feature for accidental overload a shearing pin is provided in the flywheel hub, the wheel itself being bronze bushed to prevent its freezing to the shaft.

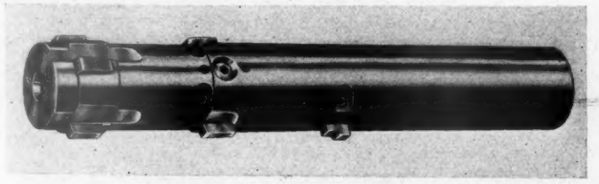


The Buffalo No. 15 billet shears

The capacity of the machine illustrated is 7-in. square, or 7¾-in. round bars of .15 carbon steel, and is one of twelve sizes, ranging in capacity from 1-in. to 8¾-in. bars.

Four-Cutter Boring-Head Tool

THE illustrated four-cutter boring-head tool has recently been brought out by the Davis Boring Tool Company, 6200 Maple avenue, St. Louis, Mo. The expansion unit is the same as the expansion unit in the regular Type L Davis expansion boring bars with the exception that it is in a vertical position instead of a horizontal position and when the micrometer screw is turned the wedge is brought forward, expanding all the cutters equally.



The Davis four-cutter boring-head tool

In using the four-cutter tool, double the amount of feed is used as with the two-cutter roughing bar, saving approximately one and one-half minutes per wheel; the same feed is used for roughing as for finishing. The cutters are designed heavy to transfer heat rapidly, enabling the operator to remove twice the amount of stock per revolution without any excessive heat. The expansion mechanism in this tool is made from high grade tool steel and all working surfaces are hardened and ground to precision limits. The body of the tool is manufactured from Molybdenum steel which is heat treated to give approximately twice the amount of torsional strength of the average tool steel.

The tool can be operated in both horizontal and vertical positions and can be furnished with cutters for boring cast iron or steel. The cutters used in this tool are

manufactured from high-speed steel. They are heat treated and hardened to obtain the maximum cutting results and are thoroughly inspected and tested for uniformity.

American Klopp Shapers

THE American Klopp shapers, manufactured by the American Klopp Shaper Corporation, 50 Church street, New York, are of the crank type, the tool being carried on a reciprocating ram. The motion is transmitted through gearing which carries the adjustable crank pin.

The Klopp shapers have a characteristic 30-deg. table support

The column of the machine is large and box ribbed, backing the walls rigidly to prevent deflection under strains. The 30-deg. table support from the base is a departure from ordinary design and is used to eliminate vibration of the table and chatter in the work. The 30-deg. table supports are standard equipment on all sizes manufactured except the 10-in., 14-in. and 16-in. shapers.

The lever or crank is of heavy construction, ribbed and reinforced to minimize stresses, and has scraped ways for the crank-pin block. The cross rail is of box construction, ribbed and reinforced.

The tool head, with a maximum swivel of 30 deg., is proportioned to resist tool twist during heavy cuts. The head has automatic power down-feed to the head and automatic bottom-limit stop provided as standard equipment on all models except the 10-in., 14-in. and 16-in. sizes.

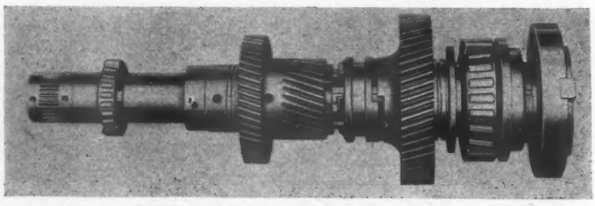
The speed box is of the selective sliding-gear type in units comprising two or three speed changes. It is operated by levers and is mounted on the rear of the machine. A unique feature of the machine is that only two gears are in mesh and only two spindles in motion at any one time. All gears, racks, pinions, worms and worm wheels are of heat-treated alloy steel, and the temper and hardness is localized to obtain the greatest possible combination of wear and strength.

Monarch Flanged Spindle Nose

THE Monarch Machine Tool Company, Sidney, Ohio, has recently brought out a lathe spindle which is made from an upset forging with the flange forged integral with the spindle. The short tapered centralizing section and the flange, as well as the taper hole in the spindle, are all ground, locating from the journal bearings of the spindle.

Chucks, plates and fixtures used with the spindle are machined to working gages to fit on the spindle nose, allowing .004 in. draw-fit against the locating flange to centralize the chucks and fixtures. There are no threads in the flange on the spindle. Studs, anchored in the body of the chucks, plates and fixtures and nuts on the back of the flange are used to hold the plates and chucks on the spindle nose. This design is used to effect alinement and to centralize the face-plate when it is desirable to remove and reapply the chuck with the work bolted in place.

Two sizes of spindle noses cover the entire range of Monarch lathes. The spindle having an 8¼-in. diameter flange is used on all lathes up to and including those with a 20-in. swing. The 11-in. flange is used on all larger sizes of lathes. No adapter plates are required in mounting chucks. The chucks fit on the spindle nose, the purpose being to reduce overhang and increase the rigidity of the mounting. A driver key takes all the driving strain from the studs which are used to hold the chucks and the plates on the spindle nose. The chuck plates and fixtures are designed to interchange on Monarch flanged spindle noses and on flanged spindle noses of turret lathes or on other machines having spindle noses machined to P. & W. master gages.



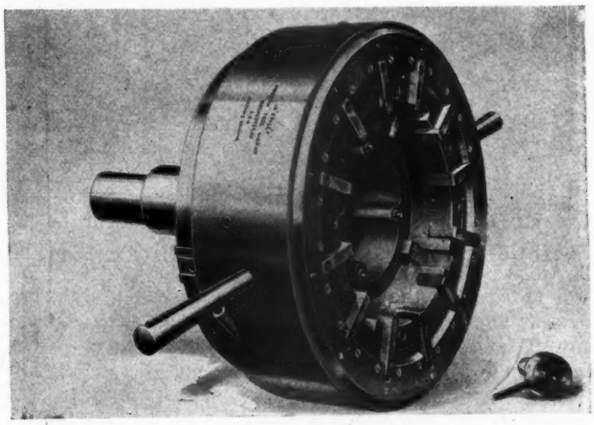
The Monarch flanged lathe—spindle nose with flange forged integral with the spindle

Modern 14-In. Self-Opening Die Head

A *STATIONARY* self-opening die head for use on turret lathes has been brought out by the Modern Tool Works Division of the Consolidated Machine Tool Corporation, Rochester, New York. This die head has a capacity for cutting threads from 10 in. to 14¼ in. in diameter. Its outside diameter is 21½ in. and its length, less the shank, is 8½ in. This wide range of thread-cutting capacity is obtained by the use of a chaser-holding ring which is fitted into the bore of the die head to give added support to the chasers when cutting small diameter threads. Chaser slots in the ring and die head are ground together to insure perfect alinement.

The die head is designed to operate as positively as a die head one-eighth its size. This is accomplished by a cam ring which is mounted on two sets of roller bearings, one in the front and one in the rear, thus reducing friction to a minimum when the die is opened and closed. Each chaser, of which there are twelve in a set, is held in its slide by one screw and can be readily removed. The chaser slides are cammed to the large cam ring so that at the point of opening each chaser is pulled out of the cut.

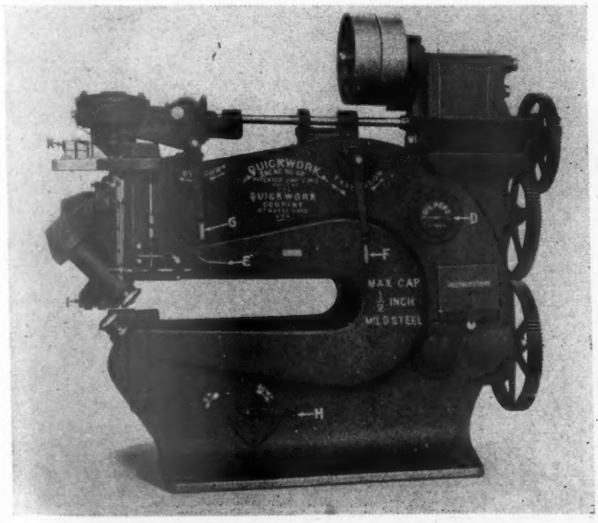
There are four points of lock for holding the die in its closed position. After adjustment for size is made a special device prevents any change. The die, arranged with an internal trip which is adjustable for length of thread to be cut, is hardened and ground throughout.



The Modern 14-in. die head compared with one of ½-in. size

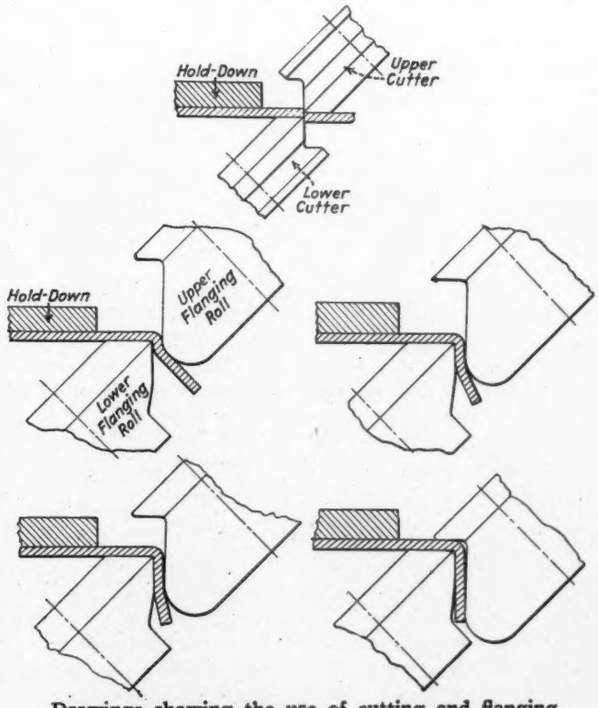
Quickwork Standard Shear

THE Quickwork Company, St. Marys, Ohio, has developed a shear, known as its No. 40A, which is equipped for offsetting plates for lap joints. The machine has three speeds, power control for the upper cutter head, adjustable automatic knockout stop for the cutter head, an indicator, a hold-down arrangement for the work and a small table at the lower cutter.



The Quickwork No. 40 A shear

The illustration shows the belt-drive arrangement, but motor drive can be furnished. All bearings on the lower half of the machine are oiled through tubes accessible by raising the cover *D*. Separate tubes oil other bearings. *E* is the clutch, *F* controls the speed changes, and *G* controls the raising and lowering of the upper cutter head. There is an adjustable automatic stop on the rear controlling the up-and-down movement of the cutter head. *H* controls the longi-



Drawings showing the use of cutting and flanging attachments

tudinal adjustment of the lower cutter shaft, and the hold-down *I* and the table *J* are vertically adjustable.

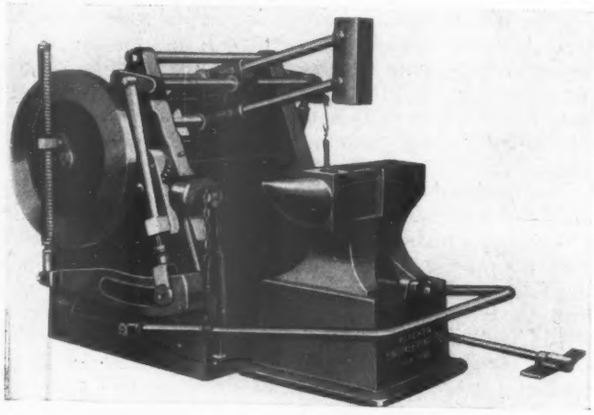
Beveling, circle cutting, and flanging attachments, as well as slitting gages and joggling rolls, can be used.

The Blacker Power Sledge

THE Blacker Engineering Corporation, New York, has recently placed on the market a power sledge, which is a combination of a power hammer and a hand anvil. It is a blacksmith hammer rather than a forging hammer and uses regular hand anvil tools. The anvil weighs 500 lb. and has two Hardie holes for bottom swages and a cut-out for double shouldering and similar jobs.

The travel of the hammer head is controlled by means of a swinging foot lever with a slide gear shift and has automatic knock-off to center it above and directly over the Hardies.

The weight of the blow struck by the hammer may be varied from a mere tap to three or four times that of a hand sledge. Single blows, light and heavy blows intermingled, or blows at the rate of 140 per minute can be struck. The hammer is actuated by a link-motion drive, there being no belts, pulleys or clutches included in the driving mechanism. The weight of the blow varies directly with the depression of a foot treadle which acts upon the slipper through reduction gearing to a worm and segment arm.



The Blacker B blacksmith hammer

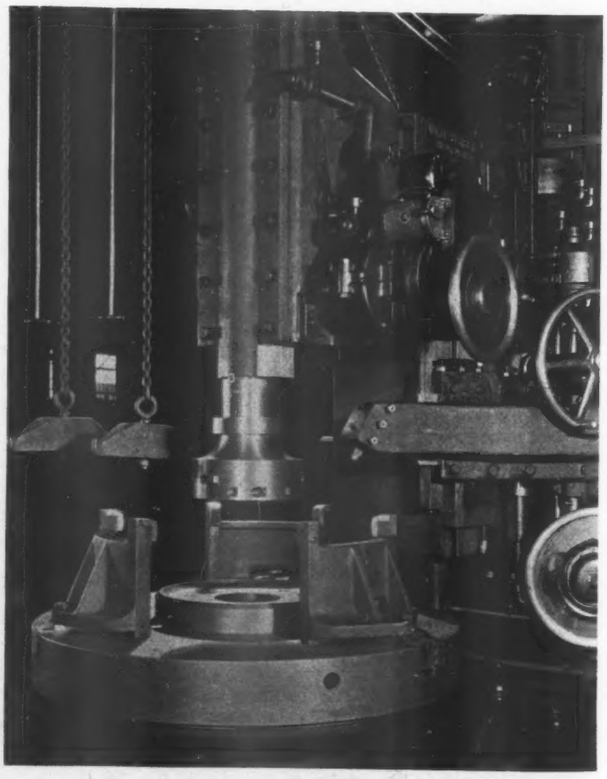
Sellers Car-Wheel Borer

WILLIAM Sellers & Co., Inc., Philadelphia, Pa., has placed on the market a 54-in. heavy-duty car-wheel boring and facing machine. The borer is designed to handle bores 15½ in. to 18 in. in diameter to meet the requirements of the special patented roller-bearing wheels and axles made by the American Steel Foundries.

In this arrangement the wheels are mounted on a hollow axle through which a solid axle passes. This solid axle is carried in standard journals but is pinned so that it cannot revolve. The wheels are bored out and mounted on special Timken bearings so that they, with their hollow axle, rotate freely about the fixed axle. It is this unusual mounting which requires bores 15½ in. to 18 in. in diameter.

In the first setting the wheel is chucked in the machine with the flange up and is bored and faced simultaneously. A special four-cutter tool head is inserted in the ram. It has two roughing and two finishing cutters which permit finishing the bore with one pass of the cutter head. In the second setting the wheel is turned over to permit facing the other end of the hub. The machine is arranged to bore and face wheels 26 in. to 36 in. in diameter on the tread. However, an additional set of jaws would permit handling larger wheels.

The heavy steel facing arm has a 5-in. vertical adjustment and a 28-in. horizontal power traverse. The table, 54 in. in diameter, is arranged with a simple automatic chuck which centers the wheels, chucks, and unchucks them by power. The machine with two cranes attached, one on each side, is driven by a 20-hp. 3 to 1 d.c. motor.



The Sellers car-wheel borer for large diameter bores on patented roller-bearing wheels

Betts Oilgear-Feed Car-Wheel Borer

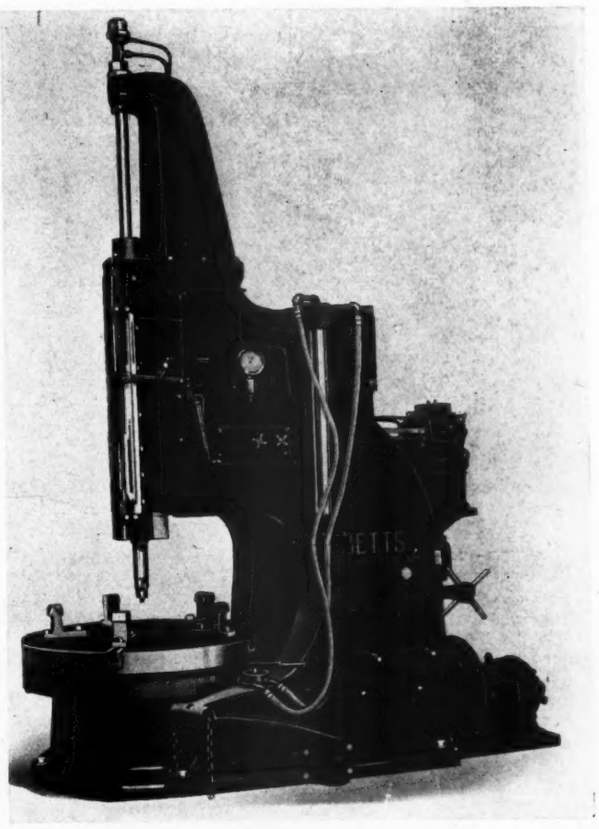
THE application of oilgear feed to the Betts heavy-duty car-wheel borer is announced by the Consolidated Machine Tool Corporation of America, Rochester, N. Y. In this machine the entire operation of feeds and rapid traverse is controlled by oil pressure to obtain heavier feeds and faster production and at the same time eliminate feed gearing.

By the use of oilgear feed on this machine the entire cycle of boring operations is automatic, requiring no attention from the operator, so that he merely has to start the machine and is then free to do other work while the car wheel is being machined.

The car wheel is placed on the table by means of a hoist furnished with the machine, which may be either mechanically or air operated and may be either of the single or double type. As the machine is started the wheel is automatically chucked.

The boring bar, which holds the roughing cutter, the finishing cutter and the chamfering cutter, descends quickly by rapid traverse as soon as the feed lever is thrown in. As the roughing cutter reaches the bore its speed is automatically cut down to the proper feed rate for rough boring. When the roughing cut is completed the rate of feed changes, so that the finishing cutter enters the work automatically at the proper finishing feed. After the finishing cut is completed the edge is automatically chamfered by the chamfering cutter and the boring bar returns automatically by rapid traverse to its original position.

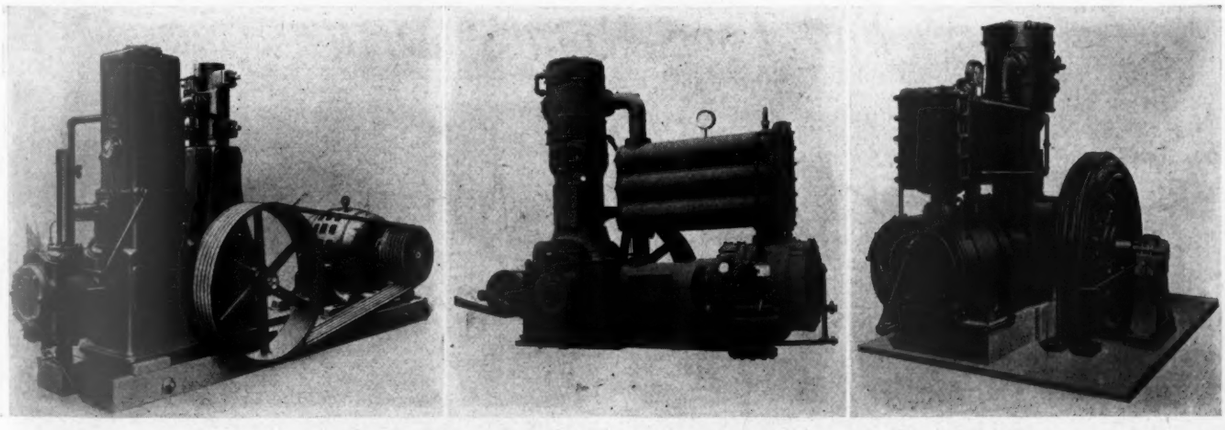
The table has four speeds, obtained by means of hardened-steel gears running in oil. The feed rate of the machine can be changed under cut by the operator and can also be stopped at any point in the work. When desired, a hub-facing head may be applied to the machine which is also provided with oilgear feed.



The Betts heavy-duty car-wheel borer

Improved Angle-Compound Compressors

THE Sullivan Machinery Company, 400 North Michigan avenue, Chicago, Ill., has developed improvements in its line of angle-compound compressors. Refinements have been made in the multi-step load control to produce closer power economy at partial load, additional intercooler area has been provided to increase the compressor efficiency and several new sizes have been added to the range of the angle-compound line. The line now includes a range of compressors from a single unit having 287 cu. ft. displacement to a double



Sullivan angle-compound compressors

or twin unit having as large as 5,900 cu. ft. displacement.

The adaptability of the angle compressor to any available form of drive has been extended. The machines may be operated by belt from any prime mover or by direct connection to electric motor, Diesel engine, steam engine or water wheel. Many variations of electric drive may be applied, such as direct connection through magnetic clutches, automatic stop and start control, and others.

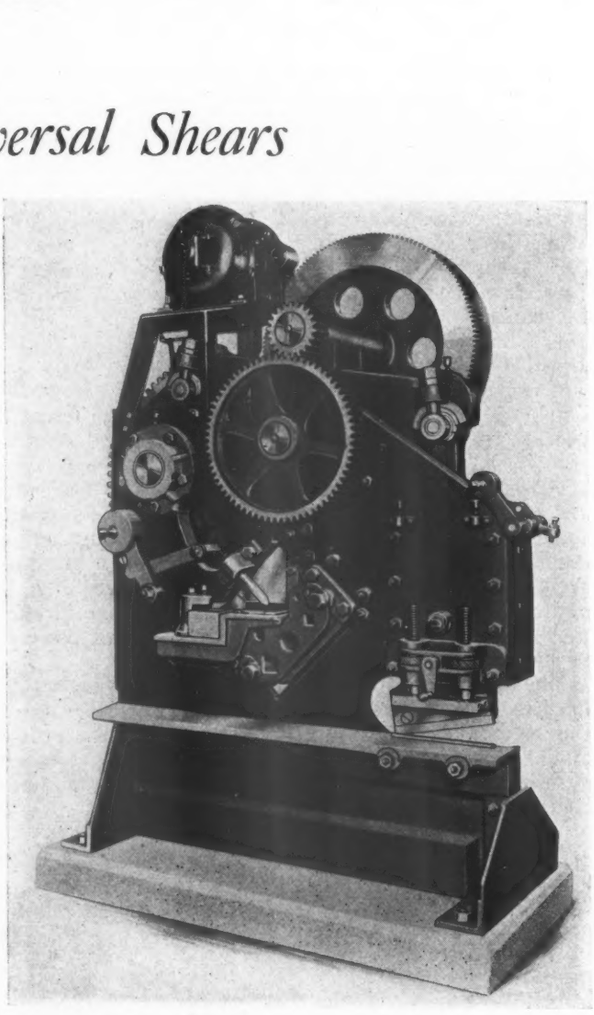
Buffalo Universal Shears

THREE larger sizes of Universal shears designated as Nos. 2½, 3½ and 4½ machines have been added to the line of the Buffalo Forge Company, Buffalo, N. Y. These shears have electrically welded armor-plate frames and one eccentric to operate both the shear and bar cutter. The two tools are operated in succession, that is, both tools are actuated during the course of one revolution of the eccentric but not at the same instant. This design is used to prevent overloading the machine and yet to permit the use of two separately controlled parts of the machine at the same time.

Capacities of Buffalo Universal Shears

	No. 2½	No. 3½	No. 4½
Shear			
Plates: Through center	¾ in.	⅞ in.	1¼ in.
Trimming	⅞ in.	1 in.	1⅜ in.
Flats with standard knives	6 by ⅞ in.	7 by 1 in.	7½ by 1⅜ in.
Trim angles	6 by ¾ in.	6 by ⅞ in.	6 by 1 in.
Length of knives	12 in.	13¾ in.	16½ in.
Bar cutters with standard knives			
Rounds	2¼ in.	2½ in.	3 in.
Squares	2 in.	2⅛ in.	2⅝ in.
Angles 90 deg.	6 by ½ in.	6 by ⅝ in.	6 by ⅞ in. or 8 by ⅝ in.
Angles 45 deg.	4 by ½ in.	4 by ⅝ in.	6 by ¾ in.
Tees 90 deg.	4 by 5 by ½ in.	4 by 5 by ⅝ in.	6½ by 6½ by ½ in.

The shear blades are reversible and provided with four cutting edges, while the bar cutter is the same as on other Buffalo shears. Angles can be cut on a miter without inclining the stock. The capacities of the three machines shown in the table are based on soft steel, of 65,000 lb. tensile strength or .15 to .20 carbon. Special knives can be provided for shearing heavier stock than that given in the table.



The Buffalo universal shears

The Thor Rotary Drill

THE drill shown in the illustration is the product of the Independent Pneumatic Tool Company, 600 West Jackson boulevard, Chicago, and is designated by that company as the No. 02 Rotary drill. The drill is designed with no reciprocating parts to overcome the mechanical limitations of the piston tools and is constructed to lift speed restrictions and stop waste power.

The No. 02 drill has a speed of 2,000 r.p.m. with a drilling capacity of ¼ in. It weighs 3¾ lbs., is 9¼ in. in overall length and can be furnished with a throttle cap. Another drill, similar to the No. 02 and designated as the No. 01, is also the product of this company. This latter drill has a speed of 3,000 r.p.m., a drilling capacity of 3/16 in., an overall length of 9¼ in. and is also furnished with a throttle cap.

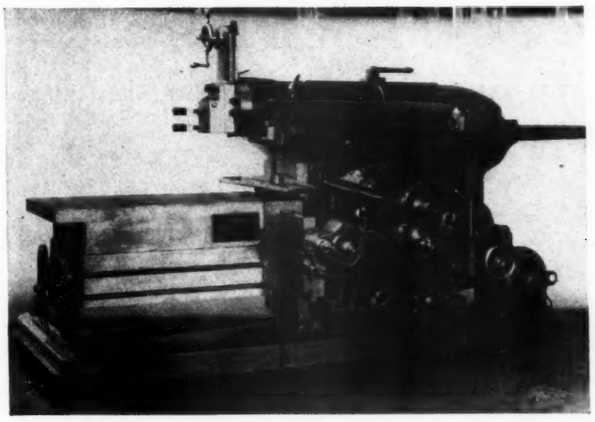
The Thor No. 02 rotary drill

The Ohio Super-Dreadnaught Shaper

JOSEPH T. Ryerson & Son, Inc., Chicago, has placed on the market a 36-in. shaper which is designated as the Ohio Super-Dreadnaught. The machine is heavily designed and ribbed to strengthen the bull-gear hub and the rail and ram bearings. The ram and rail bearings are large to eliminate chatter or vibration on the heavy cuts required on driving-box work. The square-ram bearings are fitted with three-piece adjustable gibs to permit equalization for wear. A heavy rail, with wide table support equipped with a special adjustable table jack, is used to preserve the alinement of the table.

A special extension head, used with either a single or double driving-box attachment, is used to machine the crown-brass fit and collar seat of a driving box. Other special attachments adapting this tool to locomotive repair work include a fixture for shoe and wedge fits, a rod-brass attachment, a shell or crown-brass attachment, a shoe and wedge chuck and a fixture for machining electric-locomotive driving-wheel boxes.

All control levers, grouped within a radius of 12 in., are reached from the operator's position at the side of the machine. Proper lubrication for all parts is secured by a forced-feed automatic lubricating system.



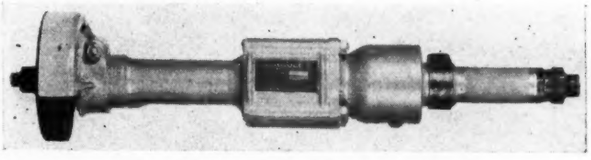
The Ryerson Ohio Super-Dreadnaught shaper

Hercules Portable Grinders

THE Buckeye Portable Tool Company, Dayton, Ohio, has developed two Hercules grinders for use with 4-in. wheels, either vitrified or high speed. These models are numbered 320-3 and 323-3.

The overall size of these grinders is 18 in. and they are 3 in. in diameter, the small size making them usable in close quarters. It is equipped with the Hercules special throttle, the Hercules governor and an oil chamber.

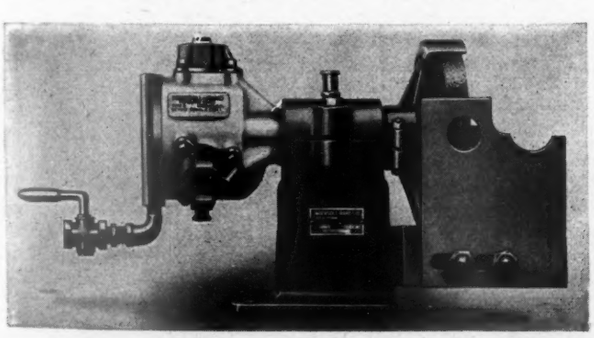
The model No. 320-3 has a speed of 6,000 r.p.m. and uses either a 4-in. vitrified wheel or a 6-in. high-speed wheel, while the model No. 323-3 has a speed of 9,000 r.p.m. and uses a 4-in. high speed wheel or various small cone and pencil grinders.



The Hercules grinder No. 320-3

A Pedestal-Type Grinder

A BENCH-type pedestal grinder, which is designated by the manufacturer as type 9 and which can be bolted to a bench or a portable air compressor, has recently been brought out by the Ingersoll-Rand Company, 11 Broadway, New York. The motor of this grinder has three cylinders which are spaced about the center line of the spindle and which deliver power to one crank pin. The three cylinders are interchangeable. The flow of air to the motor is controlled by a hand-operated globe valve. The motor operates in a bath of lubricant, all the moving parts being immersed.



The Ingersoll-Rand type 9 grinder

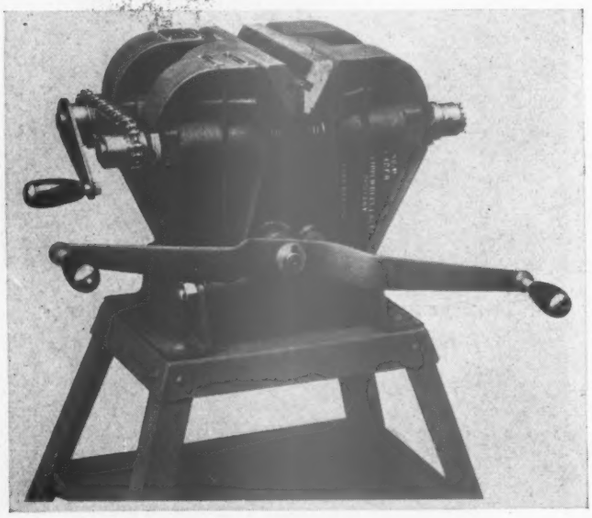
The machine has a free speed of 3,000 r.p.m. and is designed to take a 6-in. to 8-in. vitrified grinding wheel having a ½-in. face. A bit chuck is attached to the end of the grinder spindle to take a drill or a reamer with a ½-in. straight shank. A steady rest in front of the wheel aids the operator in handling the work. Grindings are prevented from being blown in the face of the operator by means of the exhaust which is directed through the base of the machine.

Standard equipment with this grinder includes one

8-in. by 1-in. No. 24 grade-Q vitrified wheel for iron and steel grinding and one bit chuck for ½-in. straight-shank drills or reamers which is attached to the end of the grinder spindle.

Clipper Belt Cutter and Lacer

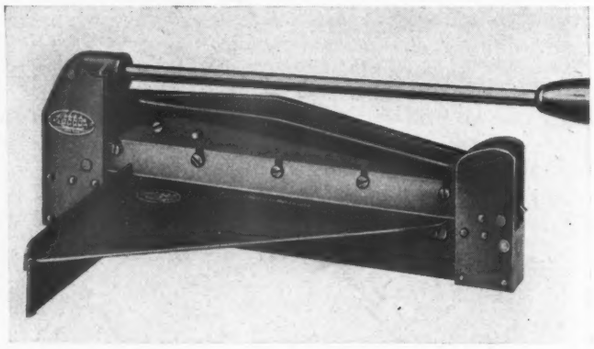
THE belt cutter shown in one of the illustrations is the product of the Clipper Belt Lacer Company,



The Clipper No. 8 belt lacer

Grand Rapids, Mich. This cutter is the open-end type and can be used for cutting lengths from roll or squaring ends of belting of all sizes up to 10 in. in width.

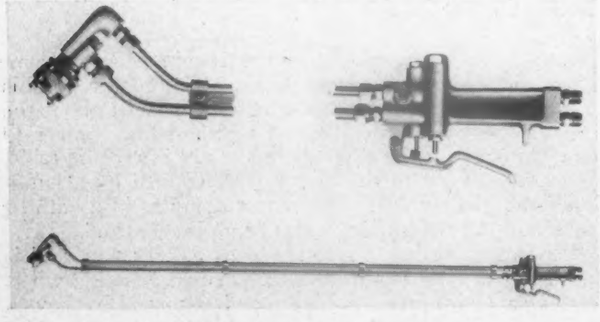
This company has also placed on the market a belt lacer which can lace a belt 8 in. wide in one operation in approximately 40 sec. A three-quarter turn of the crank forces the jaws of the lacer uniformly into an 8-in. belt under a pressure of 45,900 lb., embedding the hooks in perfect alinement flush with the surface of the belt. The lacer weighs 100 lb. and is designed to be used with equal efficiency and economy on small as well as large belts.



The Clipper belt cutter for use on belts up to 8 in. in width

Extension Spray Gun

A SPRAY gun used to apply paint directly to surfaces several feet beyond the ordinary reach without the use of scaffolding or ladders has been placed on the market by the DeVilbiss Company, Toledo, Ohio. The spray gun designated as the Type NT equipment, is designed for use on railroads for painting locomotives, freight cars, interior walls, ceilings, trusswork, etc.



The DeVilbiss NT extension spray gun

The spray head of the gun is removable and is designed with a graduated adjustment feature for controlling the atomized spray to produce quality results with the extension gun. The extension handle is light but rigid and is curved at an angle to put the spray head in line with the handle, providing a proper balance.

The air and fluid valves are located in the handle adjacent to the trigger, dispensing with the customary fluid needle. The valves are of large size to permit ample flow for fast work. The volume of air is regulated by an adjusting valve in the side of the handle.

The extension handle can be furnished in 3-ft., 4-ft., 5-ft. and 6-ft. sizes, which weigh 18 lb., 22 lb., 26 lb. and 30 lb., respectively.

LONDON & NORTH EASTERN (Great Britain) motive power requirements for 1930 total 144 new locomotives. These include 15 of the "Sandringham" 4-6-0 class for express passenger service between London and the eastern counties; 15 "Shire" class express passenger locomotives; 26 three-cylinder 2-6-2 tank locomotives; 14 three-cylinder 2-6-0 fast freight locomotives; 15 three-cylinder 2-8-0 freight locomotives; 35 locomotives for general service, and 24 switchers, mostly of the 0-6-0 type. The company will also try out a new 47-ton, 200 hp. steam rail coach.

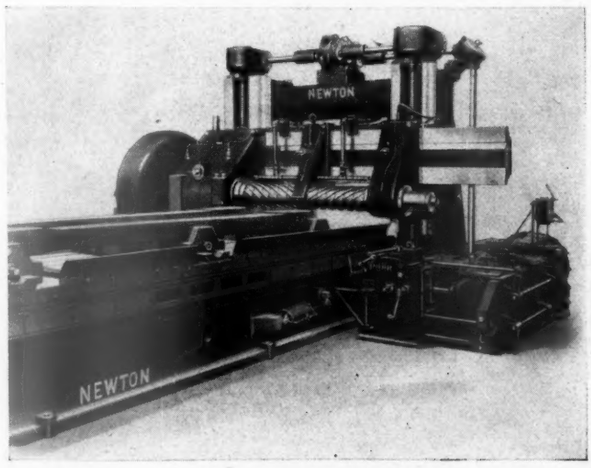
Newton Milling Machines

THE Consolidated Machine Tool Corporation of America, Rochester, New York, has recently brought out a line of Newton milling machines which are especially adapted to railroad shop practice.

Horizontal Rod Miller

The horizontal rod-milling machines are built for slabbing, channeling and contour milling locomotive rods. They are built in two sizes; one with a table width of 42 in. and a larger one with a table width of 54 in. The drive is by a motor mounted on a bracket near the floor and directly gear-connected to a six-change gear box. From this point the drive is transmitted through hardened steel bevel gears to a vertical splined shaft carrying a large diameter coarse-pitch steel driving worm meshing with a large phosphor-bronze worm wheel on the spindle.

The feed drive also originates from the main driving motor and is connected to a speed box. The table, of heavy box construction, is driven by a bronze spiral pinion meshing with an angular steel rack underneath the table. Power feed and rapid traverse in both directions are provided, and the table feed may be reversed independently of the spindle speed. The table may be automatically stopped in any position. It may also be



The horizontal rod miller

locked at any point to permit taking cuts with the crossrail feeding.

The crossrail is provided with vertical feed and quick traverse in either direction. The vertical feed operates from the gear box with vertical shaft running to the top. A scale and pointer on the crossrail permits sinking of the cutters to the proper depth.

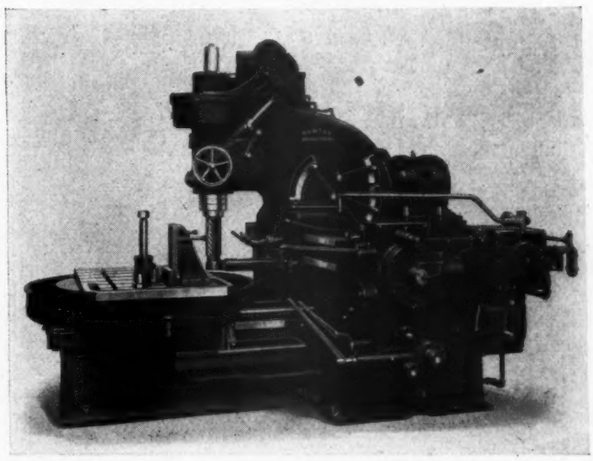
The base and upright are of heavy box section designed to withstand the strain of heavy cuts. A sump tank for catching the cutter coolant is cast integral with the base. Cutter coolant is supplied under pressure from the gear pump to a reservoir in the top of the upright from which it flows by gravity to the cutters and table into the sump tank.

Lubrication for all revolving bearings is by a centralized oiling system. It permits pressure lubrication of the entire machine in a very few seconds.

All essential gears except bronze worm wheels are made of steel, the driving gears being hardened. The driving feed gears are enclosed to operate in oil. Universal vise type fixtures for holding the locomotive rods while slabbing and channeling can be furnished and the table slots can also be provided in accordance with requirements.

Driving-Box Miller

The driving-box milling machine is designed to finish the inside or reference face of driving boxes with its two vertical spindles. It automatically mills taper

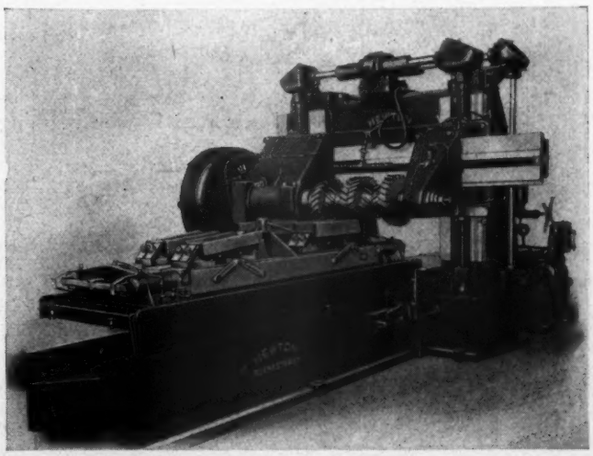


The vertical rod miller

finish on the shoe and wedge faces of the boxes with the two horizontal spindles. The use of two fixtures on a swivel table, arranged to index 180 deg., permits the operator to load one fixture while the casting in the other is being milled.

The spindle drive originates from the main motor at the top of the machine and is transmitted directly to the main driving shaft. The drive is then transmitted through suitable gearing to each spindle.

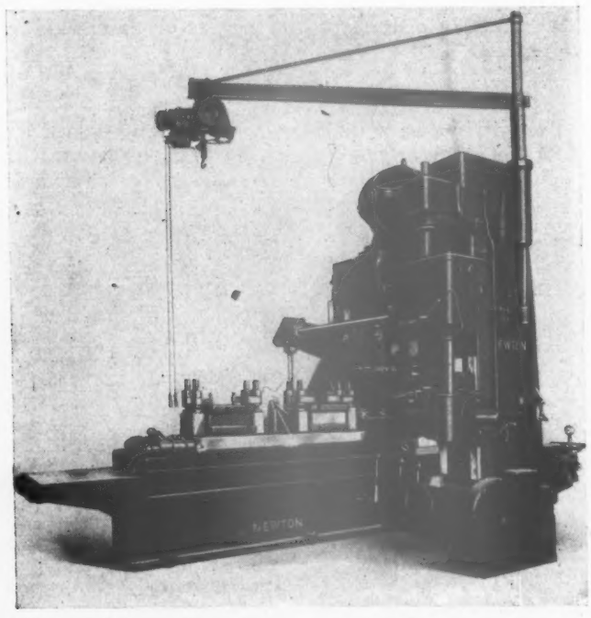
The vertical spindle heads, adjustable horizontally, and the two horizontal heads, one of which is adjustable vertically, are mounted on an inverted U-shaped crossrail. The crossrail is counterweighted and fed vertically by a



The shoe and wedge miller

cam to cut the tapers on the boxes. The rapid traverse to the crossrail is by a separate reversing motor.

The table feed and rapid traverse in either direction are controlled by levers conveniently located. Adjustable dogs are provided alongside the table for stopping the



The driving-box miller

feed and rapid traverse in accordance with the work being done. Lubrication is by a centralized oiling system providing a quick and easy method of insuring complete lubrication to all bearings.

Shoe and Wedge Miller

The shoe and wedge milling machine is a production machine built to take care of finishing locomotive shoes and wedges and crosshead shoes up to 26 in. in length. The use of a two-station indexing fixture accommodating four castings allows the loading of two castings while the other two are being milled.

A 40-hp. motor connected by a system of spur and bevel gears to a hardened-steel worm and large phosphor worm wheel is used for driving the spindle. All driving parts are enclosed and run in oil. Spindle speed may be varied to permit the proper cutting speed for driving the cutters in bronze, cast iron, or cast steel.

The table is of standard heavy plate construction finished with T slots located in proper position to take the fixtures. The table feed and rapid traverse are controlled by levers conveniently located. The operator can set the machine to obtain rapid approach to the cut, at which point the feed is engaged. After the cut is completed the table trips to quick return and comes back to indexing position. Power elevation to the crossrail is obtained through a separate motor directly connected by spur and bevel gears to vertical screws in the base of the housing.

Vertical Rod Miller

The vertical rod milling machine is for profiling locomotive rods and straps. The working surface of the table is 54 in. in diameter. Drive originates from a 30-hp. motor mounted on the spindle-head housing. The driving gears are enclosed and run in oil. The spindle head housing has a long cross-travel on the base and is provided with hand adjustment, power feed and rapid traverse in both directions. The spindle has a vertical hand adjustment and is equipped with an indicator dial giving readings in thousandths of an inch. Spindle adjustment is made by worm and wormwheel. Both the table and head have 18 changes of feed and speed. In and out movements of the table as well as the circular movement are provided with hand adjustment, power feed and rapid traverse in both directions.

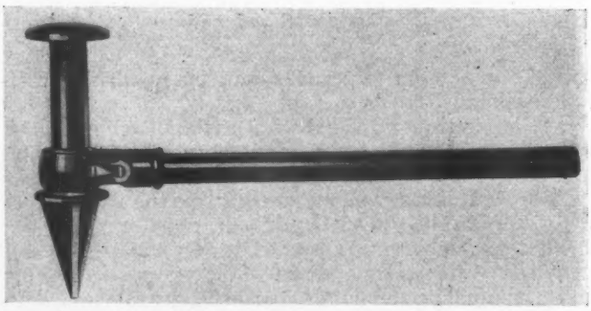
Control levers are brought out convenient to the operator and all adjustments are made from one position.

Lubrication is taken care of by a centralized oiling system for all revolving bearings. A crane hoist mounted on the spindle housing can be furnished for this machine if desired.

Reamers for Large and Small Pipe

TWO reamers, one for use on ⅛-in. to ¾-in. pipe and one for use on 4 in. and other large size pipe, have recently been placed on the market by the Oster Manufacturing Company and the Williams Tool Corporation, Cleveland, Ohio. A feature of the 4-in. pipe reamer is the screw feed, the pitch of which is so designed that a high pressure is exerted by the reaming

The Oster-Williams 4-in. pipe reamer



The Oster-Williams Chip Chaser reamer for small pipe

blades. This eliminates the necessity for pushing against the tool to obtain sufficient pressure for a thorough reaming job. The reamer was designed primarily to be used with the Oster No. 414 Power Boy, but provision has been made so that two additional handles may be used for hand operation. The body of the tool is made of certified malleable iron and there are three reaming

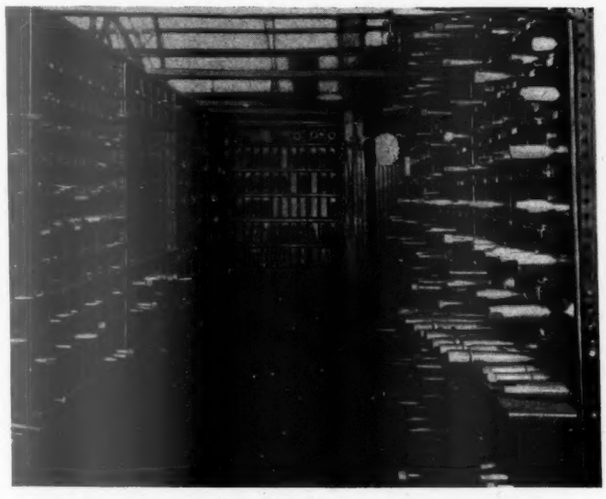
blades, so designed that they can be replaced if necessary.

The smaller reamer is designed with three reaming blades and is so constructed that it can be attached to, or removed from, the Oster-Williams No. 00 Chip Chaser ratchet handle. The Chip Chaser used with this ratchet handle is also an addition to the Oster-Williams' line of products and is designed for use on pipes ranging from ½-in. to 1¼-in. in diameter. This tool is designated as the No. 001 Chip Chaser and is built on the same principle as the Oster-Williams No. 00 Chip Chaser. It has an open-type die head with a larger chip clearance and permits easy oiling of the pipe. The No. 001 has four die heads—½-in., ¾-in., 1 in. and 1¼-in. The ratchet is built into the handle but is so placed that the operator can easily reverse the action of the ratchet or put it in neutral position.

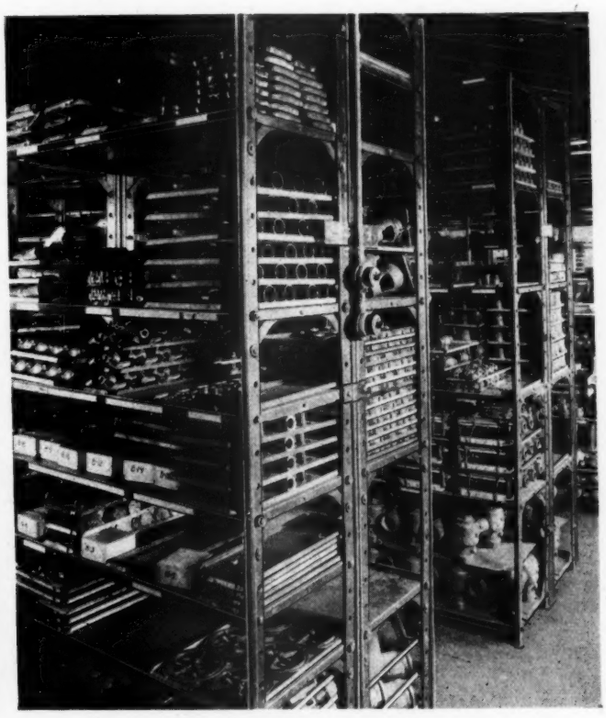
Lyon Metal Racks

IN the illustrations are shown two metal racks which are manufactured by the Lyon Metal Products, Inc., Aurora, Ill. The one is the Lyon standard heavy-duty open-type rack for use in stockrooms, while the other is used in toolrooms for carrying large drills, reamers, dies, taps and various items for heavy-duty work.

The open type of shelf employs the unit piling system, using trays or pans of various widths on which to store material. On these pans are noted the material count so as to simplify inventory taking. The shelving itself is designed to carry heavy loads and is adjustable on 3-in. centers. The shelves can be removed and located to any desired position.



Lyon metal rack for toolroom use



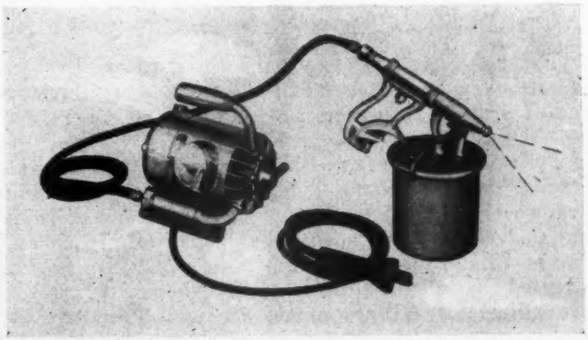
The Lyon standard open-type rack

The rack is rigidly designed to eliminate side or lateral sway. The shelves are arranged so that they are held in compression. This is done by tightening two bars which, when screwed up tight, makes the entire rack rigid. One of these bars runs under the front end and the other runs under the rear end of each shelf.

The Paasche Round or Fan Sprayer

THE Paasche Airbrush Company, Diversey Parkway, Chicago, has placed on the market a round or fan sprayer designed to furnish a narrow or a wide fan spray with low air pressure. The device, designated as the LPAB sprayer, is equipped with a pistol grip, trigger action and a taper friction color-control sleeve which can be adjusted to obtain various speeds and sizes of spray. It is designed without bleeder valves and to operate in all positions.

An air compressor is included with the equipment. The compressor has an air-cooled handle and silencer and furnishes an even flow of pressure for light air brush and sprayer use. The sprayer is furnished complete with a 10-ft. electric cord and 12 ft. of $\frac{3}{16}$-in. braided air hose equipped with Screwtight couplings.



The Paasche LPAB equipment for round or fan spraying

Electric Babbitt Pot

THE Harold E. Trent Company, of Philadelphia, is manufacturing an electric babbitt-melting pot with bottom spouts and positive-action valves. All parts of the control mechanism and the heating elements are entirely outside of the crucible of the melting vessel, leaving the inside free from obstacles such as heating units, valve projections and temperature-control units. This renders it easy to stir the babbitt and to clean out the pot after using. The spout is heated by the main heating units which furnish sufficient heat to enable the spout to be operated in the coldest or during the most adverse weather conditions.

The turning of a handwheel (which stays cool) releases a steady stream of metal from the bottom of the pot, the spout guiding the stream wherever it is wanted. If the bearing fills before the pot is emptied, a quick twist of the valve-wheel shuts off the metal before it overflows. Attached to the pot housing is an automatic temperature controller which regulates the heating up to the instant of pouring.

The Trent electric babbitt pot

All-Steel Tool Cabinet

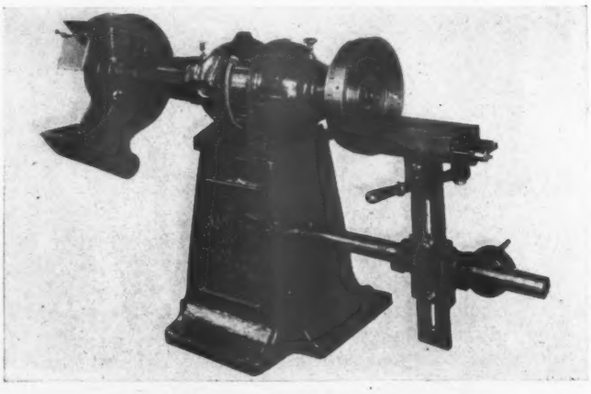
THE All-Steel-Equip Company, Aurora, Ill., has developed four types of steel cabinets for the storage of drills, reamers and similar tools and other similar equipment.

Each of the four types has steel angle and channel frames, with substantial body members to sustain heavy weights. Standard equipment includes six sloping shelves with five adjustable partitions in each and one horizontal shelf near the bottom. They are so constructed that all tools are in plain sight and all shelves are adjustable. Where tools are stored outside the tool room, a model with locking doors can be furnished. Doors are panel reinforced and have a three-point latching device, vault type handles and a Yale lock. The cabinets are finished in green baked enamel.

The all-steel tool cabinet for storing small tools

Standard Grinder

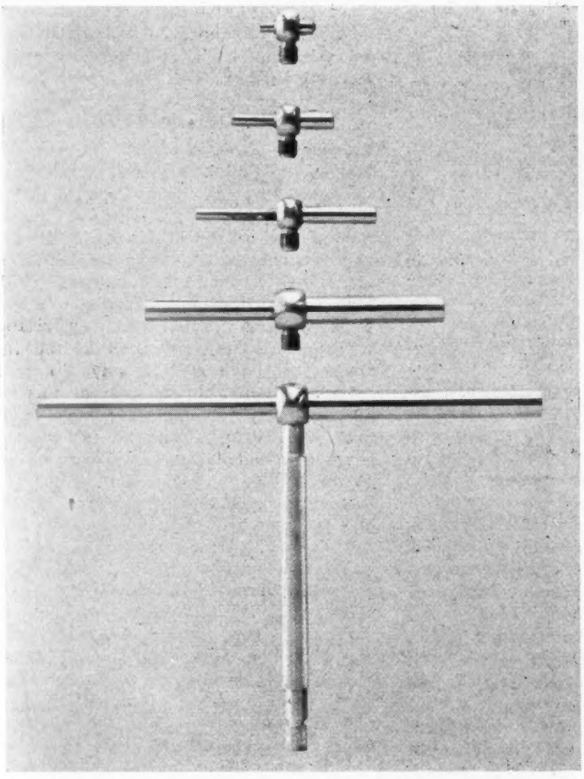
A COMBINATION grinder having a ring-wheel chuck on one end of the spindle and an emery wheel on the other has recently been placed on the market by the Standard Electrical Tool Company, 1938 West Eighth street, Cincinnati, Ohio. This machine is made in 2-, 3-, 5- and 7½-hp. sizes and is equipped with SKF ball bearings. A ball thrust bearing is used to take the end thrust of the ring-wheel chuck. The machine shown in the illustration is one of the 5-hp. size and is equipped with a General Electric motor.



The Standard electrical combination grinder

B. & S. Telescoping Gages

THE Brown & Sharpe Manufacturing Company, Providence, R. I., has recently developed a tool for use with the micrometer to determine internal measurements formerly difficult to obtain. Styled as the No. 590 telescoping gages, it comprises five heads which



The B & S No. 590 telescoping gages

are interchangeable in one handle. The telescoping head is inserted in the hole or slot to be measured where it expands to the exact size of the hole. A turn of the knurled screw on the end of the handle locks the head and the gage is then removed and measured with a micrometer. Each head is a self-contained unit, there being no parts to become mislaid or lost. Measuring surfaces of the heads are ground to a radius, adapting the tool for use in measuring curved surfaces.

A Cutter Clearance Gage

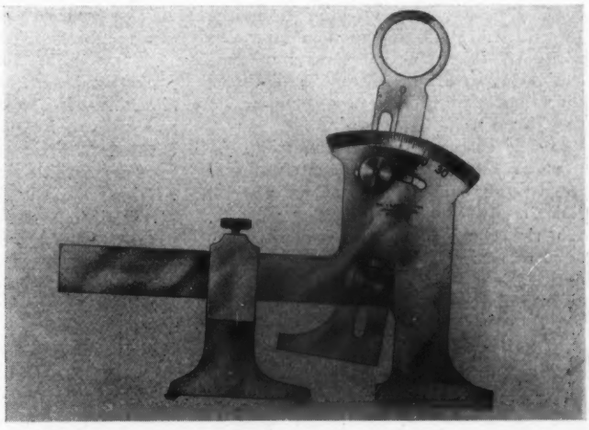
THE L. S. Starrett Company, Athol, Mass., has developed a cutter clearance gage designed for the determination of clearances on all types of milling cutters. The tool, designated as Gage No. 459, gives precise readings in degrees on cutters from 2 in. to 30 in. and more in diameter. It is adaptable to end, side, helix, spiral or inserted-tooth cutters and in addition it can be used in checking clearance on many special types of cutters.

The gage consists of a tool-steel beam, fitted with one stationary foot with its contact edge parallel with the beam, a sliding foot, its edge also parallel with the beam, and an upright blade which is adjustable both perpendicularly and obliquely. The upright blade is graduated in degrees, from 0 to 30.

Three adjustments are required for the reading.

The gage as applied to a 4-in. helical cutter

Measuring side clearance on large-diameter, coarse-pitch cutters is possible because the contact edge of the sliding foot is in line with the edge of the stationary foot.



The Starrett cutter-clearance gage No. 459

The perpendicular and angular adjustments of the upright blade are independent of each other, allowing precise determinations.

The gage can be applied without disturbing the cutter. It is unnecessary to remove the cutter from its arbor on the grinding or milling machine.

MANCHESTER'S highly critical standard of artistic appreciation has set a problem for the chiefs of the London, Midland & Scottish and the London & North Eastern, whose efforts to reach a solution have taken a novel and amusing form. A coach for the new Manchester, South Junction & Altrincham line electric service, which made its appearance at Euston station (London) for the inspection of leading railway officials, has one side painted a vivid emerald green and the other in maroon red. The panels and windows are painted and lined in an extraordinary galaxy of colors, including red, gold, cream, black and salmon pink. The ends of the coach are also painted in different colors, while the painting scheme on one side is altered every few feet. The result is so startling and weird as to draw crowds of puzzled and amused passengers to gaze at the strange looking vehicle. Mancunians can rest assured, however, that such vivid-hued "rainbow" coaches will not be provided for their travels between the city and Altrincham.

Among the Clubs and Associations

THE NEW YORK RAILROAD CLUB announces that in place of the usual one-day outing there will be two gala days this year—a boat outing on a Hudson River Line boat on Thursday, July 10, and a railroad and railroad supply men's championship golf tournament at Wing Foot Golf Club, Mamaroneck, in August.

PACIFIC RAILWAY CLUB.—Papers on various motive power department topics will be presented at the July meeting of the Pacific Railway Club, at which master mechanics from each of the Pacific coast railroads will be present. The meeting will be held on Thursday evening, July 10, at the Hotel Oakland, Oakland, Cal.

ENGINEERS, scientists, economists, and other representatives from about fifty different countries are expected to attend the Second World Power Conference which will be held in Berlin, Germany, from June 16 to 25, with a view to improving, from the technical and commercial point of view, the methods of generating and distributing energy in every form and to promoting the use of energy by international collaboration. A series of addresses on the present and future power supply problems of general public interest will also be delivered and, upon the conclusion of the conference, the members will be afforded an opportunity of visiting the most important power and industrial plants in Germany.

MECHANICAL DIVISION PROGRAM.—The program for the eleventh annual meeting of Division V—Mechanical, American Railway Association, which will be held in the Auditorium at Atlantic City, N. J., June 18 to 25, is as follows:

WEDNESDAY, JUNE 18

Address by R. H. Aishton, president, A.R.A.
Address by Chairman G. E. Smart
Action on minutes of 1929 meeting
Appointment of Committees on Subjects, Resolutions, Correspondence, etc.
Unfinished business
New business
Report of General Committee
Report of Nominating Committee
Discussion of report on Lubrication of Cars

THURSDAY, JUNE 19

Address by W. P. Borland, chief, Bureau of Safety, Interstate Commerce Commission
Paper on Freight Car Inspection Pit, by R. L. Kleine, assistant chief of motive power, Pennsylvania
Discussion of committee reports:
- Arbitration
- Prices for Labor and Materials
- Loading Rules
- Tank Cars
- Brakes and Brake Equipment
- Wheels

FRIDAY, JUNE 20

Address by M. J. Gormley, executive vice-president and chairman of Car Service Division, A.R.A.
Discussion of reports on:
- Car construction
- Safety Appliances (Including report from H. A. Johnson, director of research in charge of Power Brake Investigation and Automatic Train Line Connector Investigation)
- Couplers and Draft Gears

MONDAY, JUNE 23

Address by Hon. Frank McManamy, chairman, Interstate Commerce Commission
Discussion of reports on:
- Specifications and Tests for Materials
- Joint Committee on Reclamation
- Automotive Rolling Stock
- Locomotive and Car Lighting
- Lubrication for locomotives

TUESDAY, JUNE 24

Address by Samuel M. Vauclain, chairman of the board, Baldwin Locomotive Works
Discussion of reports on:
- Locomotive Design and Construction
- Electric Rolling Stock

WEDNESDAY, JUNE 25

Address by A. G. Pack, chief inspector, Bureau of Locomotive Inspection, Interstate Commerce Commission
Discussion of reports on:
- Design of Shops and Engine Terminals
- Joint Committee on Utilization of Locomotives

Election of Officers and members of General Committee
Adjournment

Club Papers

Locomotives of Today

Anthracite-Lehigh Valley Section, A.S.M.E.—E. A. Borell, engineer of motive power, Reading, presented a paper entitled "Locomotives of Today" at a meeting of the Anthracite-Lehigh Valley Section of the American Society of Mechanical Engineers at Reading, Pa. on March 21, 1930. ¶ Mr. Borell made a brief comparison of the modern locomotives with the type of power used in 1832. His selection of an example of a modern steam locomotive was the Reading 2-10-2 type locomotives which were converted from Mallet compound 2-8-8-2 type locomotives. [A description of these locomotives was published in the September, 1929 issue of the *Railway Mechanical Engineer*, page 547.] ¶ The larger portion of Mr. Borell's paper was devoted to a description of the automatic train control equipment as it is applied to a locomotive and its operation as a safety device.

Safety Appliances

Car Foremen's Club of Los Angeles—Meeting held in the Pacific Electric Club building, Los Angeles, Calif., May 9, 1930. ¶J. W. Krause, chief clerk, car department Union Pacific and secretary-treasurer of the Car Foremen's Club of Los Angeles, presented a paper on safety appliances in which he outlined the origin of safety appliances on the railroads in the United States with respect to I.C.C. regulations, the purpose of these appliances, and a brief outline of their design and function; the duties of car inspectors and the danger of safety appliance defects. Mr. Krause stressed the need of a continual campaign for the better inspection of cars and also the need of striving for efficiency in the maintenance of safety appliances on railroad equipment. He emphasized the need for friendly cooperation between employees at interchange points and the possibility of improved maintenance by checking up each other's work on a friendly basis.

Lubrication and Rule 66

Chicago Car Foremen's Association—Meeting held at the Great Northern hotel, Chicago, May 12. ¶ In a paper on the above subject, G. W. Ditmore, master car builder of the Delaware & Hudson and chairman of the Committee on Lubrication of Cars and Locomotives of the Mechanical Division, said that in spite of the general improvement in lubrication and hot-box prevention work, the railroads still have a long ways to go in reaching their ultimate goal in this important detail of operation. He stated that since 1926, when the Delaware & Hudson initiated a serious drive to get to the bottom of its hot box troubles by correcting mechanical defects and installing a systematic treatment of journal boxes with a better grade of oil and waste, the average miles per hot box has increased from about 33,000 to 104,000 miles. One of the things Mr. Ditmore particularly stressed was that, in view of the wide distribution of the equipment, freight car journals can be satisfactorily lubricated only when all roads display a zeal and unity of purpose in improving their own as well as their neighbor's equipment and in carrying out Rule 66. ¶ Mr. Ditmore closed his adddress by inviting the members to inspect the modern oil and waste reclamation plant owned and operated by the Lelaware & Hudson at Oneonta, N. Y.

Hot-Box Prevention

Eastern Car Foremen's Association—Meeting held in the Engineering Societies building, New York, May 23. ¶ G. W. Ditmore, master car builder, Delaware & Hudson, presented a similar paper, entitled "Lubrication and Rule 66," to that which he presented at a meeting of the Chicago Car Foremen's Association, May 12. A summary of Mr. Ditmore's paper is given in the report of that meeting. ¶ Those who took part in the discussion of the paper at the New York meeting emphasized the necessity of living up to the Requirements of Rule 66 if the railroads expect to reduce the number of hot boxes caused by defective lubrication. There was considerable discussion relative to the viscosity of the oil as specified by the A.R.A. One speaker advocated that the best viscosity for an oil suitable for both winter and summer use should be about 60, while several other speakers advocated reducing the viscosity to around 48 and 50. ¶ The question of waste grabs causing hot boxes was discussed at considerable

length with no definite conclusions or recommendations being arrived at, except that all boxes should be properly packed and that all rough spots should be removed from car journals.

The Safety Appliance Act

Pueblo Car Men's Association—Meeting held at Pueblo, Colo. April 11, 1930. Paper presented by William A. Kelly, car foreman, Atchison, Topeka & Santa Fe, entitled The Safety Appliance Act. ¶ The need for a law, such as the Safety Appliance Act, Mr. Kelly said, was first brought forcefully to the attention of the public by the short-comings of the old link and pin coupler. Accidents on account of this device were of common occurrence in the early days of railroading. This was not only the fault of the coupler, he said, but was also due to the lack of standardization of equipment. However, the problem of interchanging equipment between railroads rapidly became a vital question in steam railroad transportation. ¶ Mr. Kelly reviewed the development of the present A.R.A. standard coupler from the time of the original Janney coupler. This coupler was approved by the Master Car Builders Association in 1887. The holders of the Janney patents waived all claims in 1888 and as a result the present vertical plane type coupler has been developed to the present A.R.A. standard type D coupler. ¶ Mr. Kelly closed his paper by commending the work of the I.C.C. inspectors who, he said, are always ready at all times to give advice and to help pertaining to any matter concerning safety. This, with the cooperation of the men who inspect and make repairs to cars, is reducing the hazard and difficulty of handling rolling stock far below that which the first ardent supporters of the act ever hoped to attain.

Engine Failures and Materials

Pacific Railway Club—Paper presented by William M. Barr, consulting chemist, Union Pacific, May 13, 1930. ¶ In introducing his subject, Mr. Barr said that broken engine parts are constantly being sent to the material engineer with the question, "Why did this fail?" The relation of materials to engine failures is of necessity being given more attention and study today than at any time in the past. This problem, he said, is becoming more important because of the increasing size of locomotives, greater speeds, and heavier loading now required, and the trend toward increasing temperatures and pressures in the modern boiler which are demanded for more economical operation and better service. ¶ Mr. Barr divided the subject of his paper into three subdivisions as follows: Failures resulting from mechanical defects, failures due to material defects and failures due to incorrect materials. In discussing the first subdivision, he stated that many failures occur with perfectly sound material, if such material has not been properly applied or kept in correct condition. Under this head he discussed failures due to poor flanging work in the boiler shop, careless welding, etc. ¶ Under material defects, Mr. Barr discussed heat treatment of steel, forging and improper manufacturing processes. Failures due to incorrect material were frequently caused by applying alloy steel parts which should be made of carbon steel, applying unsound castings, etc. In conclusion, he said, if failures are to be reduced the most careful attention must be given to the selection of materials used in locomotive construction, to the proper handling of these materials, both as regards heat treatment and correct machining, and to the maintenance of the various parts after the locomotive has gone into service.

Uniform Defect Carding

Railway Carmen's Club of Peoria and Pekin—Meeting held in the Railway Carmen's Club, room 38, Union Station, Peoria, Ill., March 18, 1930. W. J. Owen, chief interchange inspector, Peoria & Pekin Union, presented a paper on the importance of a uniform defect carding at the March meeting of the Railway Carmen's Club of Peoria and Pekin. ¶ Mr. Owen stated that in issuing the Wheel and Axle Manual, the A.R.A. admitted the weakness of a system which depended altogether on human judgment; not that such judgment is always wrong, but for the reasons that opinions differ, and among a number of men can be found many different kinds of judgment concerning one single matter. He described the A.R.A. defect card as being a certified check good for the full amount when accompanied by a billing repair card. In his paper, he pointed out the difficult position of many connecting-line inspectors who are subject to the orders of the local car foremen and also to the chief interchange inspector. This, he said, placed the inspector in the position of being required to serve two masters, and that is something that cannot be done. The local car foremen, he stated, has but one road to serve, but one company's interest to protect, and he is expected to protect them. He may get a number of tracers on defect cards issued at other interchange points on cars which have been received a short time before at his station. Accompanying these tracers, he said, will be a letter asking why such conditions were not detected and defect cards obtained at the time the cars were received. The foreman investigates his records, finds that his inspector has passed the cars without exceptions and then the inspectors are brought in on the carpet. The inspector, he said, endeavors to explain that the defects did no exist at the time he inspected the car, or, if they did exist, they were slight and did not require repair. This explanation, Mr. Owen said, seldom goes over. The inspector is told that there must be no more such cases and that he must see that his company is fully protected in the future if he expects to remain on the job. ¶Mr. Owen, in describing the consequences of such methods, stated that one can see every day defect cards covering defects so slight that no one would think of shopping the car for repairs—defect cards six months or a year old on loaded cars covering conditions which, if they existed to the extent requiring repairs, would make the car a fit subject for the scrap pile instead of a carrier for a load of flour, starch or sugar. ¶ The chief interchange inspector, he said, is employed and paid by all the roads at a terminal point to supervise interchange matters and to enforce the interchange rules. All matters concerning the interchange and defect carding should be referred to the interchange inspector and not to the local car foreman who is busy with other duties. If all interchange inspectors worked under the instructions of the chief inspector in matters of interchange, a uniform method of inspection and carding would result, and complaints of wrong and technical carding would be eliminated.

Western Railway Club Holds Annual Dinner—Officers Elected

Western Railway Clubs—The annual dinner was held at the Hotel Sherman, Chicago, Monday evening, May 5. Following a musical program of unusual merit, furnished by employees of the Chicago & Alton, the feature of the evening was an address by Rev. Dr. George Craig Stewart, rector of St. Luke's Episcopal Church, Evanston, Ill. Doctor Stewart discussed the general subject "Machinery and Men," commenting on the trend toward the increased use of machinery in this modern age and the attendant problems of unemployment and trade readjustments, for which, he said, industrialists and economists have not yet found the solution. He said that we know the credit side of the machine age, but that we must consider the debit side, represented by bread-line increases and overcrowded park benches. He called attention to the fact that man himself is a machine, but much more than a machine, and cited psychological tests in which, under the influence of adverse hypnotic suggestion, men exerted only 30 per cent of their capacity, whereas, on another occasion, under favorable hypnotic suggestion, the same men actually performed 140 per cent of what was supposed to be their maximum capacity. He said that this performance was made possible by drawing on reserves such as no machine has. ¶ In opening the meeting, President H. P. Allstrand, principal assistant superintendent of motive power and machinery of the Chicago & North Western, mentioned the well-balanced program of meetings held by the club during the past year and expressed particular appreciation for the efforts of C. M. House, superintendent of motive power and equipment of the Chicago & Alton, and J. E. Bjorkholm, assistant superintendent of motive power of the Chicago, Milwaukee & St. Paul, in getting new members. The present membership is 2,068, composed of 1,345 railway men, 691 supply men and 32 honorary members. A total of 256 new members was secured during the year. ¶ Officers elected for the ensuing year were: President, L. R. Wink, assistant superintendent of the car department, Chicago & North Western; first vice-president, C. T. Ripley, chief mechanical engineer, Atchison, Topeka & Santa Fe;

and second vice-president, O. E. Ward, superintendent of motive power, Chicago, Burlington & Quincy, Chicago. J. W. Fogg of the MacLean-Fogg Lock Nut Company, Chicago, was re-elected treasurer and W. J. Dickinson of the Duntley-Dickinson Supply Company, Chicago, secretary. The board of directors includes: C. Bucholtz, general manager, Erie, Youngstown, Ohio; B. J. Farr, general superintendent of motive power and car department, Grand Trunk Western, Battle Creek, Mich.; J. T. Gillick, vice-president, Chicago, Milwaukee, St. Paul & Pacific, Chicago; H. P. Allstrand, principal assistant superintendent of motive power and machinery, Chicago & North Western, Chicago; C. M. House, superintendent of motive power and equipment, Chicago & Alton, Bloomington, Ill.; A. W. Turner, master mechanic, Michigan Central, Niles, Mich.; J. H. Nash, Chicago; J. H. Reisse, mechanical assistant to the vice-president, Chicago, Burlington & Quincy, Chicago; L. A. Richardson, general superintendent of motive power, Chicago, Rock Island & Pacific, Chicago; C. J. Wymer, superintendent of car department, Chicago & Eastern Illinois, Danville, Ill.; J. E. Bjorkholm, assistant superintendent of motive power, Chicago, Milwaukee, St. Paul & Pacific, Milwaukee, Wis., and F. F. McCarthy, division superintendent of motive power, New York Central, Elkhart, Ind.

This Machine Age

Western Railway Club—Meeting held at the Hotel Sherman, Chicago, April 21. Paper by Roy V. Wright, editor of *Railway Mechanical Engineer*, on the general subject "This Machine Age—Where is it Leading us?" ¶ Mr. Wright emphasized the rapid changes in transportation as well as in general industry and living conditions, most of which have taken place within the last 50 years, or 100 years at the most. In fact, more has been accomplished in this brief period than in all the ages which preceded it. In the field of transportation, for example, man had to depend on his own legs and those of his horse from ancient times until early in the nineteenth century. Since then, in a very short period, he has learned to ride in power-driven vehicles on land, in the air and under water. ¶ Mr. Wright commented on the use of machinery in mass production methods and quoted some interesting figures regarding the unit production in various countries. Counting the production per man in China as one, the unit production in Great Britain, for example, is 18, and in the United States, 30. Mr. Wright said that the introduction of labor-saving machinery is bound to necessitate certain adjustments in employment which will at times prove embarrassing to labor, but that as far as the railroads are concerned, both the managements and industrial leaders have a dual responsibility in training and helping employees to meet the changed conditions. ¶ In discussing this report, D. C. Buell, director of the Railway Educational Bureau, Omaha, Neb., said that individuals must be prepared to meet changed conditions brought about by mass production methods and the greatly increased use of machinery in the present age. He said that in the past so much of the attention of railway officers has been concentrated on "routine" emergency work that they have had little opportunity to do constructive, forward thinking about the problems of human relation confronting the railways. He said that by careful study, much can be accomplished in making the force reductions attendant upon the installation of improved machinery without inflicting excessive hardships upon the employees' citing, for illustration. the experience of the Union Pacific Coal Company. Eugene McAuliffe, president of the company, recognized the necessity of mechanizing the mines, but gave particular study to minimizing the hardships on employees, due to this vital change in operating methods, by taking advantage of natural labor turnover, deaths and retirements. Mr. Buell said that whereas the attention of railway men in past years has been concentrated on reducing the number of employees for a given output, it must now be devoted to caring for their present forces and helping them to function efficiently. He said that railway employees do not want charity, nor are the railroads in a financial position to become charitable institutions, and that the reduction in the number of employees as a result of installing labor-saving machinery constitutes, in many respects, a national problem. Mr. Buell closed his remarks with the statement that more attention must be given to personnel problems on the railroads and that, whereas employees were formerly left to solve their own problms, it is now the duty of every supervisor to give more thought to the proper training of men.

The following list gives names of secretaries, dates of next or regular meetings and places of meeting of mechanical associations and railroad clubs.

AIR-BRAKE ASSOCIATION.—T. L. Burton, Room 5605 Grand Central Terminal building, New York.

AMERICAN RAILWAY ASSOCIATION.—DIVISION V.—MECHANICAL.—V. R. Hawthorne, 59 East Van Buren street, Chicago. Annual convention June 18-25, Atlantic City, N. J.

DIVISION V.—EQUIPMENT PAINTING SECTION.—V. R. Hawthorne, C hicago. Next meeting, Sept. 9-11, 1930, Congress Hotel, Chicago.

DIVISION VI.—PURCHASES AND STORES.—W. J. Farrell, 30 Vesey street, New York. Annual convention, June 18-20, 1930, Atlantic City, N. J.

DIVISION I.—SAFETY SECTION.—J. C. Caviston, 30 Vesey street, New York.

DIVISION VIII.—CAR SERVICE DIVISION.—C. A. Buch, Seventeenth and H streets, Washington, D. C.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—G. G. Macina, 11402 Calumet avenue, Chicago. Next meeting, September 10, 11 and 12, Hotel Sherman, Chicago.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. Thirty-ninth street, New York.

RAILROAD DIVISION.—Paul D. Mahay, chief engineer, transportation department, Johns-Manville Corporation, 292 Madison avenue, New York.

MACHINE SHOP PRACTICE DIVISION.—Carlos de Zafra, care of A. S. M. E., 29 West Thirty-ninth street, New York.

MATERIALS HANDLING DIVISION.—M. W. Potts, Alvey-Ferguson Company, 1440 Broadway, New York.

OIL AND GAS POWER DIVISION.—L. H. Morrison, associate editor, Power, 475 Tenth avenue, New York.

FUELS DIVISION.—A. D. Black, associate editor, Power, 475 Tenth avenue, New York.

AMERICAN SOCIETY FOR STEEL TREATING.—W. H. Eiseman, 7016 Euclid avenue, Cleveland, Ohio.

AMERICAN SOCIETY FOR TESTING MATERIALS.—C. L. Warwick, 1315 Spruce street, Philadelphia, Pa. Annual meeting Atlantic City, N. J., June 23-27.

AMERICAN WELDING SOCIETY.—Miss M. M. Kelly, 29 West Thirty-ninth street, New York.

ASSOCIATION OF RAILWAY SUPPLY MEN.—J. W. Fogg, MacLean-Fogg Lock Nut Company, 2649 N. Kildar avenue, Chicago. Meets with International Railway General Foremen's Association.

BOILER MAKER'S SUPPLY MEN'S ASSOCIATION.—Frank C. Hasse, Oxweld Railroad Service Company, 230 N. Michigan avenue, Chicago. Meets with Master Boiler Makers' Association.

CAR FOREMEN'S CLUB OF LOS ANGELES.—J. W. Krause, 514 East Eighth street, Los Angeles, Cal. Meetings second Friday of each month in the Pacific Electric Club building, Los Angeles, Cal.

CLEVELAND RAILWAY CLUB.—F. L. Frericks, 14416 Adler avenue, Cleveland, Ohio. Meeting first Monday each month, except July, August and September, at Hotel Hollenden, East Sixth and Superior avenue.

EASTERN CAR FOREMEN'S ASSOCIATION.—E. L. Brown, care of the Baltimore & Ohio, Staten Island, N. Y. Regular meetings fourth Friday of each month.

INTERNATIONAL RAILROAD MASTER BLACKSMITH'S ASSOCIATION.—W. J. Mayer, Michigan Central, 2347 Clark avenue, Detroit, Mich. Next meeting September 23-25, 1930, Hotel Sherman, Chicago.

INTERNATIONAL RAILROAD MASTER BLACKSMITH'S SUPPLY MEN'S ASSOCIATION.—J. H. Jones, Crucible Steel Company of America, 650 Washington boulevard, Chicago.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. T. Winkless, Room 707, LaSalle Street Station, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—William Hall, 1061 W. Wabasha street, Winona, Minn. Next meeting, September 16 to 19, inclusive, Hotel Sherman, Chicago.

INTERNATIONAL RAILWAY SUPPLY MEN'S ASSOCIATION.—L. R. Pyle, Locomotive Firebox Company, Chicago. Meets with International Railway Fuel Association.

LOUISIANA CAR DEPARTMENT ASSOCIATION.—L. Brownlee, 3212 Delachaise street, New Orleans, La. Meetings third Thursday in each month.

MASTER BOILERMAKER'S ASSOCIATION.—A. F. Stiglmeier, secretary, 29 Parkwood street, Albany, N. Y.

MASTER CAR BUILDERS' AND SUPERVISORS' ASSOCIATION.—A. S. Sternberg, master car builder, Belt Railway of Chicago. Next convention August 26-28, Book-Cadillac Hotel, Detroit.

NATIONAL SAFETY COUNCIL.—STEAM RAILROAD SECTION: W. A. Booth, Canadian National Montreal, Que. Annual congress, September 29-October 4, William Penn and Fort Pitt Hotels, Pittsburgh, Pa.

PACIFIC RAILWAY CLUB.—W. S. Wollner, P. O. Box 3275, San Francisco, Cal. Regular meetings, second Tuesday of each month in San Francisco and Oakland, Cal., alternately.

PUEBLO CAR MEN'S ASSOCIATION.—I. F. Wharton, chief clerk, Interchange Bureau, Pueblo, Colo.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 1124 Woodward building, Washington, D. C.

RAILWAY CAR MEN'S CLUB OF PEORIA AND PEKIN.—C. L. Roberts, chief clerk, Peoria & Pekin Union Railway, 217 Lydia avenue, Peoria, Ill.

RAILWAY EQUIPMENT MANUFACTURERS' ASSOCIATION.—F. W. Venton, Crane Company, 836 South Michigan avenue, Chicago. Meets with Traveling Engineers' Association.

RAILWAY FIRE PROTECTION ASSOCIATION.—R. R. Hackett, Baltimore & Ohio, Baltimore, Md. Next meeting October 21-23.

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 1841 Oliver building, Pittsburgh, Pa. Meets with Mechanical Division and Purchases and Stores Division, American Railway Association.

SOUTHERN AND SOUTHWESTERN RAILWAY CLUB.—A. T. Miller, P. O. Box 1205, Atlanta, Ga. Regular meetings third Thursday in January, March, May, June, September and November. Annual meeting third Thursday in November, Ansley Hotel, Atlanta, Ga.

SUPPLY MEN'S ASSOCIATION.—E. H. Hancock, treasurer, Louisville Varnish Company, Louisville, Ky. Meets with Equipment Painting Section, Mechanical Division, American Railway Association.

SUPPLY MEN'S ASSOCIATION.—Bradley S. Johnson, W. H. Miner, Inc., Chicago. Meets with Master Car Builders and Supervisors' Association.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, 1177 East Ninety-eight street Cleveland, Ohio. Next meeting September 23-26, 1930, Hotel Sherman, Chicago.

NEWS

THE PENNSYLVANIA has awarded a contract to the George A. Fuller Company, Philadelphia, Pa., for the construction of new locomotive facilities in the Forty-sixth street yard, Philadelphia, at a cost of approximately $347,000.

THE NEW YORK, CHICAGO & ST. LOUIS has awarded a contract for the construction of a three-track reinforced concrete coaling station of 250-ton capacity at Claypool, Ind., to the Roberts & Schaefer Company, Chicago.

THE CHICAGO, SOUTH SHORE & SOUTH BEND has let a contract for the construction of a one-story repair shop, with dimensions of 100 ft. by 200 ft., and an office unit, with dimensions of 35 ft. by 100 ft., at Michigan City, Ind., to P. H. Lorenz, Moline, Ill. The cost of the improvement is estimated at $70,000.

AN ORDER has recently been placed by the Swedish State Railways for S K F anti-friction journal bearings, to be used in equipping 18,000 ore cars. The boxes are to withstand a load of 7.5 tons at a maximum speed of 60 kilometers (37 miles) per hour and are expected to make an annual mileage of from 40,000 to 50,000 kilometers (approximately 25,000 to 30,000 miles). This is believed to be one of the largest single orders ever given for roller-bearing journals.

THE CANADIAN PACIFIC plans the construction of reinforced concrete coaling plants of 300 and 150 tons capacity, respectively, at Glen Yard, Montreal, Que., and Chalk River, Ont., and of a steel coaling tower at Cote St. Paul, Montreal, the installation of new turntables at Port McNicoll, Ont., Ingersoll and Cataract and the construction of new water tanks of 40,000 or 60,000 gal. capacity at Ingersoll, Ont., Grand Valley, Bonfield and Sault Ste. Marie.

THE GREAT NORTHERN has awarded a contract for the construction of five electric cinder-handling plants, two of which are for multiple track operation, at Williston, N. D., Brockton, Mont., Glasgow, Wagner and Helena, to the Roberts & Schaefer Company, Chicago. Bids were closed on April 21 for the construction of an extension to the roundhouse at Duluth, Minn., at a cost of $85,000. A contract has also been awarded to the Minneapolis Steel & Machinery Company, Minneapolis, and the Howlett Construction Company, Moline, Ill., for the construction of a coal dock sand house and accompanying facilities at Sand Point, Idaho, at an approximate cost of $50,000.

Crank Pins Shrunk by Liquid Air

THE SPOKANE, PORTLAND & SEATTLE has been experimenting with the use of liquid air in the shrinking of crank pins when assembling them with the driving wheels of locomotives. Usually the crank pins are pressed into the driving wheels. At its Vancouver (Wash.) shop an 8-in. pin was recently shrunk with liquid air and placed in the main driving wheel of a Pacific type locomotive.

Wage Statistics for February

CLASS I RAILWAYS reported to the Interstate Commerce Commission a total of 1,544,317 employees as of the middle of February, according to the commission's monthly tabulation of wage statistics. The total compensation was $213,198,615. Compared with the returns for the corresponding month of last year this is a decrease of 61,933 in the number of employees, or 3.86 per cent, and a decrease of 4.42 per cent in compensation.

Great Northern 4-8-4 Type Locomotives—A Correction

IN DESCRIBING the engine truck of the 4-8-4 type locomotives built by the Baldwin Locomotive Works for the Great Northern in the May, 1930, issue of the *Railway Mechanical Engineer*, page 260, the statement was made "The design is of the constant - resistance equalized type." The phrase "Constant-resistance equalized type" should not have been used in connection with this truck, due to the fact that the bolster is hung on three-point suspension links.

Ohio Commission Sanctions Small Crews on Rail Cars

THE PUBLIC UTILITIES COMMISSION of Ohio, in dismissing a complaint against the Wheeling & Lake Erie has ruled that railroads are not required to employ full crews on electrically-operated railroad coaches. The commission held that the cars, although propelled by gasoline motors driving an electric dynamo, come within the classification of electric cars and therefore are not subject to the full crew law. The complaint had been filed by the Brotherhood of Locomotive Firemen and Enginemen who alleged that the W. & L. E. had violated the law in the operation of gas-electric rail cars between Toledo and Zanesville.

THE NUMBER of employees reported by Class I railways as of the middle of the month of March was 1,547,513, according to a bulletin issued by the Interstate Commerce Commission, which shows a larger reduction as compared with the corresponding month of the previous year than has been reported for any month since last fall. As compared with March, 1929, this was a decrease of 4.97 per cent and as compared with March, 1928, it was a decrease of 4.85 per cent. The largest reduction was shown in the group of train and engine service employees in which the number was 7.27 per cent less than in March, 1929, but the number in maintenance of equipment and stores shows a decrease of 6.38 per cent and in maintenance of way and structures a decrease of 4.12 per cent.

Remote Control for Steam Locomotives

A NEW TYPE OF TRAIN, the locomotive of which remains at the same end regardless of the direction in which the train is operated, pulling the cars on one trip and pushing them on the return, has made its appearance in Paris, (France), according to a report received in the Department of Commerce. At the present time this train is in use between the North station in Paris and Le Bourget flying field. When the locomotive is pushing the train from the rear, the engineman is located at a specially provided control station at what is then the front end of the train and from which he controls the train in much the same manner as the motorman of an electrically operated train.

The train is made up of nine all-steel cars, each 65 ft. 7 in. long. Electric welding has been used wherever possible in the construction of the cars to afford them resistance to shock and torsion. The welding has also eliminated all rivet heads and mouldings from exterior surfaces. The cars are equipped with automatic couplers and vestibule diaphragms, the couplings being maintained in a state of tension by heavy springs acting against the opposing bellows plates.

Entrance and exit to each car is made through two wide doors located on each side and at some distance from the end of the car. The usual compartment separations have been eliminated, the only

partitions being those forming transverse vestibules between each pair of oppositely located doors. There is a center aisle with one large central compartment and two smaller compartments at the ends of the cars. Inside and outside doors are all of the sliding type, the latter being operated by compressed air.

Missouri Pacific Builds Model Exhibition Trains

THE MISSOURI PACIFIC constructed in 1927 and has had in use since that time two miniature trains for display as a part of its exhibit at state fairs throughout the railroad's territory. Each of the trains was constructed from blue prints of standard equipment, the dimensions being reduced to one-fourth, in the case of the freight train and one-fifth in the case of the passenger train, of their actual size.

Close-up of the freight-train model

The freight train consists of a locomotive mounted upon a tractor so that the gasoline engine exhaust simulates steam and smoke as it passes through the smoke stack. The cars in the train include a miniature box car, a refrigerator car, a tank car, a flat car, a coal car and a caboose. The coal and flat cars are loaded with products that might be hauled in that type of equipment. The small locomotive on the passenger train was also mounted upon a gasoline tractor to be driven from the cab. The passenger equipment is made up of an express-mail car, two coaches, a sleeping car and an observation car.

Immediately after they were built, the trains were exhibited throughout the season of 1927 at state and county fairs at Sedalia, Mo., Lincoln, Neb., Topeka, Kan., and Hutchinson, Little Rock, Ark., Memphis, Tenn., Shreveport, La., Beaumont, Tex., Tyler and Austin and at a number of points in the Rio Grande valley in Texas. It is estimated that during its first season of service the exhibit was inspected by nearly a million persons, while since its construction it has been viewed by several times that number.

In the succeeding years, the equipment has been in constant demand in Missouri Pacific Lines territory for use in parades and other celebrations sponsored by local civic organizations. At each point where the trains were used, boys in the community were selected to make up two regulation crews.

Scholarship at Stevens

THE MECHANICAL DIVISION, American Railway Association, has a scholarship at Stevens Institute of Technology which will be vacant this September. It is available for the sons of members of the Mechanical Division and the course leads to the degree of Mechanical Engineer. The course offered also includes instruction in electrical, civil and other branches of engineering.

Stevens Institute of Technology has set aside for the benefit of the student chosen for this scholarship, the sum of $1,200 from the unexpended income of the association's scholarship fund, of which $200 will be credited toward the $300 installment of tuition due on Septemper 12, 1930. The remaining $1,000 may be drawn on by the student at any time during his four-year course for the purpose of paying any net tuition installment due under the sliding-scale plan, provided only that not more than $400 shall be so used in any one academic year.

Applications for these scholarships should be in the hands of the secretary not later than July 1, 1930. The scholarship will be awarded by the president of the college, on the recommendation of the association, to the student who, on the basis of his complete high-school record and because of other indications of character and aptitude, is judged by him to be best qualified for a college education in engineering. Should there be no applications for this scholarship from the son of either a living or deceased member of the Mechanical Division, the scholarship will then be available to the son of any railroad employee.

Full information as to the course of study, entrance requirements, arrangements for examination, etc., will be supplied by the secretary, V. R. Hawthorne, 59 East Van Buren street, Chicago.

Soviet Delegates Outline Plans for American Technical Assistance

INTERVIEWED following the completion of a four weeks' coast-to-coast trip by the delegation of Soviet railway executives who have been studying operating methods in this country and Canada, D. E. Sulimov, vice-commissar for transportation of the Soviet Union and head of the delegation, outlined recently the relations which Soviet railway officials hope to establish with the American railway industry. After describing briefly the five-year plan of reorganization and new construction under which Soviet railways are now operating, Mr. Sulimov spoke in part as follows:

"The reorganization of our railway system to a point where it will be able to cope with the rapid development of industry and agriculture will necessitate the construction of several thousand powerful locomotives and large-capacity

The models on display

freight cars. The rolling stock will be equipped with automatic brakes and couplings and there will be an extensive reconstruction of railway junctions and road beds. This will require from $3,500,000,000 to $4,500,000,000.

"We are not able to state definitely at this time the form and the scope of the business arrangements which we hope to make in this country. We have in mind negotiating an agreement for designing the types of powerful locomotives and freight cars best adapted to our conditions. We expect also to take up the question of technical assistance by American firms in the production in the U. S. S. R. of rolling stock and other equipment selected by us.

"We should be glad to arrange for a regular exchange of information between the railroads of the United States and of the Soviet Union. This would give us the possibility of systematically applying the technical experience of this country in the field of railroad operations to the complicated problems involved in reorganizing the Soviet railways."

THE NEW YORK, NEW HAVEN & HARTFORD has awarded a contract for the construction of a 300-ton reinforced concrete coaling station at Waterbury, Conn., to the Roberts & Schaefer Company, Chicago.

Supply Trade Notes

R. C. BIRD has been appointed sales engineer of the Chicago Steel Foundry Company.

THE DETROIT GRAPHITE COMPANY has removed its Chicago sales office to 20 North Wacker drive.

THE LIMA LOCOMOTIVE WORKS, INC., has moved its New York office to 60 East Forty-second street.

THE UNIVERSAL DRAFT GEAR ATTACHMENT COMPANY has moved its office to 332 South Michigan avenue, Chicago.

THE OHIO BRASS COMPANY, Mansfield, Ohio, has moved its Chicago office to 20 North Wacker Drive.

TOM M. GIRDER, chairman of the Republic Steel Corporation, has been elected president to succeed E. T. McCleary, deceased.

RICHARD F. STRAW has been appointed sales manager of the Wright Manufacturing Company, Bridgeport, Conn. Mr. Straw has been connected with this company in a sales executive capacity for more than 12 years.

THE FRANKLIN RAILWAY SUPPLY COMPANY, INC., has moved its offices to the Lincoln building, 60 East Forty-second street, New York City.

THE AMERICAN ARCH COMPANY, INC., has moved its general offices to the Lincoln building, 60 East Forty-second street, New York City.

BARLOW W. BROOKS has been appointed sales representative of the Standard Coupler Company with headquarters at Chicago, to succeed Joseph M. Welles, resigned.

LAWFORD HOWARD FRY, metallurgical engineer of the Standard Steel Works Company, Burnham, Pa., has resigned and has been appointed railway engineer of the Edgewater Steel Company, Pittsburgh, Pa. Mr. Fry was born at Richmond, P. Q., Canada, on June 16, 1873. He attended private schools in the United States, Canada and England and the City and Guilds of London Technical College, 1893; University of Gottingen, 1894, and Hannoversche Technische Hochschule, 1894-97. In 1897 he became employed in the erecting shop of the Baldwin Locomotive Works and in 1904 was appointed engineer of tests. From 1904 until 1913 he

L. H. Fry

was technical representative of the Baldwin Locomotive Works in Europe, during the latter year becoming metallurgical engineer of the Standard Steel Works Company. During 1909 Mr. Fry became an affiliate member of the American Railway Master Mechanics' Association, now Division V—Mechanical, American Railway Association. He is a member of the American Society of American Engineers; Institution of Mechanical Engineers; Institution of Civil Engineers; Institution of Locomotive Engineers; American Society for Testing Materials; Iron and Steel Institute; and American Iron and Steel Institute. He is the author of "A Study of the Locomotive Boiler" and numerous technical papers.

Domestic Orders Reported During May, 1930

Locomotives

Name of Company	Number ordered	Type	Builder
Indianapolis Union	4	Switching	Baldwin Loco. Works
Weirton Steel Company	1	Switching	American Loco. Company
Baltimore & Ohio	3	4-8-2	Baldwin Loco. Works
	2	Mallet (2-6-6-2)	
Aliquippa & Southern	2	Switching	American Loco. Company
Bangor & Aroostook	3	4-8-2	American Loco. Company
Peoria & Pekin Union	2	Switching	Baldwin Loco. Works
General American Tank Car Corporation	1	Switching	American Loco. Company
General American Tank Car Corporation	1	Switching	American Loco. Company
Total for the month of May	18		

Freight Cars

Name of Company	No. cars ordered	Type	Builder
Union Refrigerator Transit Company	500	Refrigerator	General American Car Co.
Oliver Iron Mining Company	10	Air Dump	Magor Car Corporation
Carnegie Refining Company	3	Tank	General American Tank Car Corporation
Chicago, Milwaukee, St. Paul & Pacific	500	Stock	General American Car Co.
Warrior River Terminal	62	Gondola	Pullman Car & Mfg. Corp.
Chesapeake & Ohio	4	Air Dump	Magor Car Corporation
Total for the month of May	1079		

Passenger Cars

Name of Company	No. cars ordered	Type	Builder
Erie	5	Express	American Car & Fdy. Co.
Central of New Jersey	25	Coach	Pressed Steel Car Co.
	5	Combination pass. & bagg.	
Reading	10	Baggage	American Car & Fdy. Co.
New York, New Haven & Hartford	1	Club	Standard Steel Car Co.
Southern Pacific	1	Lounge	Pullman
	3	Observation	
Chicago, Milwaukee, St. Paul & Pacific	2	Dining	Pullman
Erie	20	Suburban	Standard Steel Car Co.
Total for the month of May	72		

THE AIR REDUCTION SALES COMPANY has moved its executive offices from 342 Madison avenue to the Lincoln building, Forty-second street opposite the Grand Central, New York City.

O. O. WILLIAMS, for several years a member of the Magor Car Corporation sales department at New York, has been appointed assistant general sales manager of that corporation, with headquarters at New York.

J. J. HENNESSY of the Hennessy Lubricator Company, has his headquarters as formerly, at the main office of the company, 136 Liberty street, New York. A branch office was recently opened by the company at 20 East Jackson boulevard, Chicago.

THE GLOBE STEEL TUBES COMPANY has moved its eastern district sales office to the Lincoln building, 60 East Forty-second street, New York City. Paul C. Lewis, formerly with the Alloy Steel Products Company, Boston, Mass., is now associated with the sales department of the Globe Steel Tubes Company at its New York office.

THE GENERAL PNEUMATIC TOOL CORPORATION, Chicago, has been organized to sell spray painting equipment. Mortimer Sullivan, formerly vice-president and general manager of the Binks Spray Equipment Company, Chicago, has been elected president and Gerald Hale, formerly sales manager of the Binks Spray Equipment Company, has been elected vice-president.

THE LINCOLN ELECTRIC COMPANY, Cleveland, Ohio, has announced the transfer of three men from its manufacturing division to its welder service division, as follows: John C. Ardagh, Chicago district, with headquarters at Chicago; R. A. Kyle, New York district, with headquarters at New York, and Robert Newton, Cleveland district, with headquarters at Cleveland.

THE OHIO STEEL FOUNDRY COMPANY, of Lima, and Springfield, Ohio, has purchased the steel foundry department and steel casting business of the Industrial Brownhoist Corporation, of Cleveland, Ohio, and Bay City, Mich. The steel foundry is located at Bay City and will be operated at that point by the Ohio Steel Foundry Company. Extensive improvements are planned, to include a modern 15-ton open hearth furnace.

JAMES E. SAGUE, former member of the New York State Public Service Commission, died at his home in Poughkeepsie, N. Y., on May 9, at the age of sixty-seven. Mr. Sague was mechanical engineer of the Schenectady Locomotive Works from 1892 to 1901, and later was first vice-president of the American Locomotive Works. His service as Public Service Commissioner was from 1907 to 1914.

A. H. WESTON has resigned as manager, Reading specialty division, of the American Chain Company and is now associated with the Reliance Manufacturing Company, Massillon, Ohio. Mr. Weston's headquarters will be at 258 Broadway, New York City. The Detroit, Mich., office of the Reliance Company has been moved from 650 Baltimore avenue, west, to 9771 French road.

G. LARUE MASTERS, sales manager of the National Lock Washer Company, Newark, N. J., has been elected vice-president in charge of sales. Mr. Masters was born at Philadelphia, Pa., and was educated in the schools of East Orange, N. J. He entered the employ of the National Lock Washer Company

G. LaRue Masters

in 1919 and was engaged in sales work in its car window equipment department in the east until July, 1926, when he was placed in charge of the sales of that department for the entire United States and Canada under the direction of the late J. Howard Horn, general sales manager of the company. In 1927 Mr. Masters was promoted to assistant sales manager and since 1929 has served as sales manager.

THE UNION CARBIDE & CARBON CORPORATION has consolidated the Kansas City offices of its various units in its new building at 910 Baltimore avenue, Kansas City, Mo. The units in the new building include: The Linde Air Products Company, Presto-O-Lite Company, Inc., Oxweld Acetylene Company, Union Carbide Sales Company, the J. B. Colt Company and National Carbon Company, Inc.

THE PHOENIX MANUFACTURING COMPANY, Joliet, Ill., has purchased the steel tank, water treating and steel plate construction business and the plant at East Chicago of the Graver Corporation, East Chicago, and will operate this plant and business under a wholly owned subsidiary company—The Graver Tank & Manufacturing Corporation, East Chicago. The officers of the new company are: Edward N. Gosselin, president; F. C. Everitt, vice-president and general manager; P. S. Graver, vice-president in charge of sales; W. F. Graver, vice-president; H. S. Graver, vice-president, and R. E. Meyer, secretary and treasurer.

W. H. FREET, assistant sales manager of the Chambersburg Engineering Company, Chambersburg, Pa., died on April 26. Mr. Freet was born on August 12, 1881, and joined the Chambersburg Engineering Company in 1900 as private secretary to H. E. Derbyshire, president. In 1910 he was appointed purchasing agent and since 1928 served as assistant sales manager.

C. L. NEWBY, assistant manager at Chicago of the western division of the Hyatt Roller Bearing Company, Newark, N. J., has been appointed manager of the western division, with headquarters at Chicago. Mr. Newby has been associated with the Hyatt company since 1918 as sales manager on general industrial, oil field, railroad and farm machinery applications.

THE STANDARD STEEL WORKS COMPANY has moved its general offices from Philadelphia to its plant at Burnham, Pa. Frank K. Metzger, formerly vice-president in charge of sales, has been appointed vice-president and general manager, succeeding O. C. Skinner as general manager. R. Nevin Watt has been appointed sales manager, and G. H. Lewis, works manager, all with headquarters at Burnham. A district office has been established at Philadelphia in charge of H. J. Snowden, formerly connected with the St. Louis office of the company. Mr. Snowden will be assisted by M. H. McCurdy, who has been transferred from Portland, Ore.

ALBERT P. WITHALL, who has been elected president of W. H. Miner, Inc., entered the employ of the Chicago, Boston & Liverpool Refrigerator Car Company in 1894 in the woodworking department. In 1900 he was promoted

Albert P. Withall

to foreman of this department and in 1904, when the company was re-organized and became the Whipple Car Company, Mr. Withall was appointed general foreman of all shops. In 1911 he was promoted to general superintendent, which position he held until 1914 when he resigned to become chief service engineer of W. H. Miner, Inc. In 1928 he was appointed manager of sales, which position he had held until his election as president.

THE TUCO PRODUCTS CORPORATION has moved its Chicago office from the Railway Exchange building to the Peoples Gas building, 122 South Michigan avenue.

THE ELECTRO-MOTIVE COMPANY has moved its office from the B. F. Keith building to its new office building, 2160 West One Hundred Sixth street, Cleveland, Ohio.

E. D. COWLIN, formerly manager of the New York office of The Reliance Manufacturing Company, Massillon, Ohio, has been appointed general sales manager with headquarters at Massillon.

JOSEPH M. WELLES, western representative of the Standard Coupler Company, has resigned to become representative of the Globe Steel Tubes Company, Milwaukee, Wis.

ERNEST R. FUNK has been appointed mechanical representative of the J. S. Coffin, Jr., Company, Englewood, N. J. Mr. Funk was formerly with the Locomotive Stoker Company.

MARSHALL D. RAYMOND has been appointed sales representative of the American Locomotive Company and the Railway Steel-Spring Company, with headquarters at St. Louis, Mo.

E. H. BOLLENBACHER, 725 Forsyth building, Atlanta, Ga., has been appointed sales representative, in the Atlanta district, of the Pennsylvania Pump & Compressor Company, Easton, Pa.

W. A. LIBKEMAN, manager of sales of the western district of the Standard Steel Car Company, with headquarters at Chicago, died on May 13 following a heart attack.

WILLIAM C. REITZ, vice-president and treasurer of the Pittsburgh Steel Company, Pittsburgh, Pa., who was one of the organizers of that company, died on May 4, at the age of 74.

THOMAS R. SYMINGTON has severed his connections with T. H. Symington & Son, Inc., Baltimore, Md., and has become associated with the Gould Coupler Company as assistant to the president with headquarters at New York.

THE PRIME MANUFACTURING COMPANY, Milwaukee, Wis., has assumed entire control of Alemite products for locomotives, railway cars. railway shop equipment, etc. Henceforth they will manufacture and distribute all Alemite products for the above mentioned railway equipment from their plant in Milwaukee. This company has also taken over the railway field personnel of the Alemite Corporation, which includes John H. Karow, Charles Kelly Ramp and N. J. Kamen. These men will continue to work among the railroads on Alemite products as well as the standard Prime line of washout plugs, windshield wings and all small parts for locomotives.

THE WHITING CORPORATION (CANADA), LTD., with headquarters at 129 Adelaide street, west, Toronto, Ont., has been formed to manufacture all the products formerly made by the Whiting Corporation, Harvey, Ill., and imported into that country. Manufacturing operations will be carried on at Hamilton, Ont., while branch offices will be maintained in Montreal, Que., Winnipeg, Man., Edmonton, Alta., Calgary, and Vancouver, B. C. The Canadian organization will also represent the Whiting subsidiaries, the Swenson Evaporator Company, the Grindle Fuel Equipment Company, and the Harrington division which manufacturers Whiting stokers.

THE REPUBLIC STEEL CORPORATION is the name chosen for the company resulting from the merger of the Republic Iron & Steel Company, the Central Alloy Steel Corporation, the Donner Steel Company, Inc., and the Bourne-Fuller Company. The officers of the new company are as follows: Chairman of the board and president, Tom Girder, a member of the advisory committee of Continental Shares, Inc., Cleveland; first vice-president, Benjamin F. Fairless, president and general manager of the Central Alloy Steel Company; vice-president in charge of sales, Harry T. Gilbert, a vice-president and director of Republic; vice-president in charge of operations, R. J. Wysor of Continental Shares and a director of Donner; vice-president Rollin S. Hall, president of Bourne-Fuller; vice-president, William T. Witherow, president of the Witherow Steel Corporation; secretary, Richard Jones, Jr., secretary of Republic; treasurer, John J. Anderson, treasurer of Republic, and assistant vice-president in charge of sales, Alex E. Walker, assistant general sales manager of Republic. J. M. Schlendorf, vice-president in charge of sales of the Central Alloy Steel Company, has been appointed sales manager of alloy steel products of the Republic Steel Corporation, and Norman Foy, Birmingham district manager in the old Republic organization, becomes sales manager of mild steel products, with headquarters at Youngstown, Ohio.

WILLIAM T. KYLE, general sales manager of the Page Steel & Wire Company, has resigned to become president of the Welding Engineering & Research Corporation, 30 Church street, New York. Mr. Kyle was born on October 18, 1883, at Baltimore, Md. He was educated in the high schools and took courses in various academies, specializing in civil engineering. In 1901 he became an apprentice with the Bell Telephone Company at Philadelphia, Pa., and two years later went with the American Pipe & Construction Company, Philadelphia, as district superintendent on general railroad construction work. He remained there until 1908 when he went with the Duplex Metals Company as sales manager of its New York office. He later became general sales manager, and in 1915 when the company was discontinued, he beeame associated for two years with the Okonite Company as a special representative at New York. He then entered business for himself with offices in New York and Chicago and had various accounts on a commission basis. When the Page Steel & Wire Company, Monessen, Pa., which manufactured the Copper Clad Steel Wire and Armco Wire products, was purchased and taken over by the American Chain Company, Bridgeport, Conn., Mr. Kyle with his entire sales organization entered the American Chain Company under the Page Steel & Wire Company as general sales manager, with headquarters at Bridgeport. During the World War he served as a member of the Emergency Fleet Welding Committee. Mr. Kyle has been active in the American Welding Society since its organization in 1919. In 1924 he secured patents covering the application of wire fabric for Hi-Way guard, substituting it for the old type of wooden guard and cable guard. These patents were subsequently assigned to the Page Steel & Wire Company, from which company Mr. Kyle has now resigned to take up his duties with the Welding Engineering & Research Corporation which was organized to cooperate with industry in the safe and economical application of welding and cutting of metals and in the development of the industry.

William T. Kyle

DIRECTORS OF THE American Rolling Mill Company, Middletown, Ohio, and the Sheffield Steel Corporation, with plants at East Kansas City, Mo., have concluded negotiations for combining the interests of the two companies, according to an announcement by George M. Verity, chairman and Charles R. Hook, president of the American Rolling Mill Company and W. L. Allen, president of the Sheffield Steel Corporation. The combined companies will have plants at Middletown, Ohio, Zanesville, and Columbus, Ashland, Ky., Butler, Pa., Kansas City, Mo., and Oklahoma City, Okla. The Sheffield Corporation was formed in 1925 as a Delaware Corporation to acquire the Kansas Bolt & Nut Company, which was organized in 1888. In addition to

two blue annealing mills, the Sheffield Steel Corporation operates four open-hearth furnaces, a bar iron and rail and rerolling mill, bolt, nut and forging works, a wire mill, bar and rod mill and a blooming mill and has a capacity in excess of 200,000 tons annually.

AT THE RECENT ANNUAL MEETING of the Timken Roller Bearing Company, Canton, Ohio, R. C. Brower was elected secretary-treasurer, J. A. Riley, assistant treasurer and Henry H. Timken, Jr., a director. The other officers and directors were re-elected.

THE GENERAL STEEL CASTING CORPORATION has reorganized its sales department into two units: One associated with the Commonwealth division, Granite City, Ill., and the other with the Eastern division, Eddystone, Pa. Customers west of a line connecting the northwestern corner of Pennsylvania and Mobile, Ala., will be served by the Commonwealth division and those east of this line by the Eastern division. Charles P. Whitehead has been appointed sales assistant to vice-president and general manager, Commonwealth division, and William M. Sheehan has been appointed sales assistant to vice-president and general manager Eastern division.

Waugh Company Denies F. T. C. Charges

THE WAUGH EQUIPMENT COMPANY and Arthur Meeker, Frederick W. Ellis and J. B. Scott have filed with the Federal Trade Commission answers which constitute general and specified denials of most of the allegations contained in the complaint issued against them by the commission on April 3, charging the use of unfair methods of competition in the solicitation of purchases of draft gear equipment from railways on the basis of the traffic of Armour & Co.

The Waugh company denies that the majority of its common stock is owned or controlled by officers and employees of Armour & Co. or that it had entered into an agreement or understanding with the individual respondents, Messrs. Meeker, Ellis and Scott, whereby they agreed to use the volume of traffic of Armour & Co. and its subsidiaries in the solicitation of draft gear business from the railways, in consideration of which stock was issued to them. It also denies that in co-operation with the individual defendants "it has sought to induce and compel and has induced and compelled various railway companies to purchase draft gears and other railway equipment manufactured and—or sold by this respondent in preference to draft gears and other equipment of equal or higher quality manufactured and sold by competitors" by the methods outlined in the complaint.

Separate answers were filed by the individual respondents containing similar denials, each praying "to be dismissed as to this complaint most wrongfully filed."

Personal Mention

General

JOHN HEATH has been appointed mechanical foreman of the Oregon-Washington Railroad & Navigation Company, with headquarters at Pendleton, Ore.

W. D. HARTLEY has been promoted to mechanical superintendent of the Western lines of the Atchison, Topeka & Santa Fe, with headquarters at La Junta, Colo. Mr. Hartley has been connected with that

W. D. Hartley

road for 27 years. He was born at Albuquerque, N. M., on August 14, 1886, and entered railway service in April, 1903, as a machinist apprentice on the Santa Fe. In 1909 he was advanced to enginehouse foreman at Richmond, Cal., then being further advanced to division foreman at Barstow, Cal., in 1914. He was transferred to Richmond in 1918, where he remained until 1920 when he was promoted to master mechanic at Clovis, N. M. In November, 1921, he was transferred to Raton, N. M., his promotion to mechanical superintendent of the Western lines becoming effective on April 1.

J. J. SULLIVAN has been appointed superintendent of mechanical supplies of the Nashville, Chattanooga & St. Louis, with headquarters at Nashville, Tenn. This is a newly created position.

E. M. SMITH has been appointed mechanical superintendent of the Louisiana & Arkansas, with headquarters at Minden, La., succeeding J. E. Tierney, resigned.

L. D. FREEMAN, assistant to chief mechanical officer of the Chesapeake & Ohio, has been appointed assistant superintendent motive power, with headquarters at Huntington, W. Va., in charge of the locomotive shop at Huntington and the car shop at Russell. The general master mechanic is relieved of jurisdiction over these shops.

EDWIN R. BATTLEY, superintendent of motive power of the Montreal district of the Canadian National, with headquarters at Montreal, Que., has been promoted to assistant general superintendent of motive power of the Central region, with headquarters at Toronto, Ont.

J. SMITH, general foreman of the Canadian National at Toronto, Ont., has been promoted to superintendent of motive power and car equipment of the northern Ontario district, with headquarters at North Bay, Ont., succeeding J. H. McAlpine, promoted.

J. W. SURLES, who has been promoted to assistant superintendent of motive power of the St. Louis-San Francisco, with headquarters at Springfield, Mo., was born at Goose Island near Detroit, Mich., on February 11, 1875. He attended grade schools at Centralia, Ill., and entered railway service at the age of 16 years as a machinist apprentice on the Illinois Central at that point. Later he served as a machinist on the Houston & Texas Central (now part of the Southern Pacific) at Houston, Tex., and as an air brake machinist, an air brake foreman and an air brake instructor. In 1910 Mr. Surles was appointed enginehouse foreman at Houston and was then advanced to general foreman at the same point. From 1912 to 1917 he served as air brake foreman, general foreman and superintendent of shops on the Southern Pacific at Houston. From 1917 to 1923 he acted as superintendent of plant of the Grant Locomotive & Car Works, Houston, and was then appointed superintendent of the North shop of the Frisco at Springfield. For a short period in 1925 he left railway

J. W. Surles

service, returning in the same year as general foreman on the Frisco at Fort Worth, Tex. In the same year he was promoted to master mechanic at Sherman, Texas., with jurisdiction over the Texas lines, where he remained until July, 1928, when he was appointed superintendent of the West shop at Springfield. Mr. Surles became assistant superintendent of motive power on March 1.

Car Department

E. L. LaCombe has been appointed a traveling A. R. A. inspector on the Michigan Central, succeeding C. O. Peters.

C. O. Peters has been appointed a special inspector, car department, of the Michigan Central, succeeding W. J. Rourke.

W. J. Rourke has been appointed traveling general foreman, car department, of the Michigan Central, succeeding J. S. Wilson.

F. G. Moody, general car foreman on the Northern Pacific at South Tacoma, Wash., has been appointed acting master car builder, with headquarters at St. Paul, Minn., temporarily succeeding H. M. Robertson, who has been granted a leave of absence because of ill health.

Master Mechanics and Road Foremen

H. E. Felter has been appointed assistant master mechanic of the Sheridan division of the Chicago, Burlington & Quincy, with headquarters at Sheridan, Wyo.

G. L. Buck, an engineman on the Fort Wayne division of the Pennsylvania, has been promoted to the position of assistant road foreman of engines, Indianapolis division.

A. H. Bierne, master mechanic of the Western division of the Atchison, Topeka & Santa Fe at Dodge City, Kan., has been transferred to the New Mexico division, with headquarters at Raton, N. M.

E. H. Smith, assistant road foreman of engines, Grand Rapids division, of the Pennsylvania, has been appointed assistant road foreman of engines, Columbus division.

J. McCoy has been appointed master mechanic of the Midland Valley, the Kansas, Oklahoma & Gulf and the Oklahoma City-Ada-Atoka, with headquarters at Muskogee, Okla.

T. E. Paradise, master mechanic of the Sheridan division of the Chicago Burlington & Quincy, has been appointed master mechanic of the Alliance division, with headquarters removed from Sheridan, Wyo., to Alliance, Neb.

C. A. Gunkler, a foreman on the Fort Wayne division of the Pennsylvania division of the Pennsylvania, has been promoted to the position of assistant road foreman of engines, Grand Rapids division, succeeding E. H. Smith.

G. B. Pauley, master mechanic of the Alliance division of the Chicago, Burlington & Quincy at Alliance, Neb., has been transferred to the Casper division, with headquarters at Casper, Wyo., succeeding T. E. Paradise.

C. L. Adair, formerly assistant general foreman of the New York, New Haven & Hartford at New Haven, Conn., has been appointed master mechanic of the Maryland & Pennsylvania, with headquarters at Baltimore, Md., succeeding N. V. Mullen, resigned.

G. M. Lawler, master mechanic of the Arkansas River and Colorado divisions of the Atchison, Topeka & Santa Fe at La Junta, Colo., has been transferred to the Western division with headquarters at Dodge City, Kan., succeeding A. H. Bierne.

C. B. Hitch, master mechanic of the Chesapeake & Ohio, will succeed T. F. Barton as general master mechanic, western general division, with headquarters at Huntington, W. Va., with jurisdiction over the Hinton, Huntington, Ashland. Russell and Cincinnati divisions.

T. F. Barton, general master mechanic of the Western General division of the Chesapeake & Ohio, with headquarters at Huntington,, W. Va., has been appointed superintendent motive power, with headquarters at Richmond, Va. Mr. Barton was born in London, England, on

T. F. Barton

March 21, 1873. He commenced his railway career in 1887, with the Grand Trunk, and remained in the employ of that road for six years, serving successively as machinist apprentice, locomotive fireman and journeyman. During the 10 years he served with the Illinois Central he held the positions of machinist, gang foreman, enginehouse foreman, general foreman, master mechanic and superintendent of shops. Prior to his connection with the Chesapeake & Ohio, he was in the employ of the Delaware, Lackawanna & Western for a period of 15 years, serving in the capacity of master mechanic at Kingsland, N. J. He then accepted the position of master mechanic of the C. & O., being appointed general master mechanic of the Western General division at Huntington, W. Va., on February 1, 1924.

L. E. Fletcher, superintendent of shops of the Atchison, Topeka & Santa Fe at La Junta, Colo., has been appointed master mechanic of the Arkansas River division and the Colorado division, from La Junta to Canon City, with headquarters at La Junta, succeeding G. M. Lawler.

C. E. Plott, general foreman of locomotive repairs on the Chicago, Burlington & Quincy at Centralia, Ill., has been promoted to the position of master mechanic of the Centerville division, with headquarters at Centerville, Iowa, succeeding J. C. Climo, who has retired under the pension rules of the company.

M. A. Kinney, formerly superintendent of motive power of the Hocking Valley, which recently was taken over by the Chesapeake & Ohio, and which is to be operated as the Hocking division, a part of the western general division, is appointed general master mechanic, with headquarters at Columbus, Ohio, with jurisdiction over the Hocking and Chicago divisions.

Shops and Enginehouse

Harvey Hood has been appointed mechanical foreman of the Oregon-Washington Railroad & Navigation Company, with headquarters at Kamela, Ore.

J. W. Small, chief mechanical officer of the Chesapeake & Ohio, at Richmond, Va., has been granted an indefinite leave of absence.

Alexander Rau has been appointed day enginehouse foreman of the Oregon-Washington Railroad & Navigation Company, with headquarters at Albina, Ore.

J. S. Wilson has been appointed superintendent of shops of the Michigan Central, with headquarters at West Detroit, Mich., succeeding J. Bowen, resigned.

N. L. McCracken, erecting foreman at the Sacramento, Cal., shops of the Southern Pacific, has been promoted to the position of drop pit foreman, succeeding J. C. DeSano.

N. Hullen, assistant erecting foreman at the Sacramento, Cal., shops of the Southern Pacific, has been promoted to the position of erecting foreman, succeeding N. L. McCracken.

T. Frank Bellhouse, enginerouse foreman of the Southern Pacific at Sacramento, Cal., retired on March 31 after thirty-eight years of service.

Joseph C. DeSano, drop pit foreman at the Sacramento Cal., shops of the Southern Pacific, has been promoted to the position of enginehouse foreman, succeeding T. F. Bellhouse.

A. J. Ryan, machine shop foreman of the Texas & Pacific at Big Springs, Tex., has been appointed machine shop foreman, with headquarters at Fort Worth, Tex.

S. H. NEUBERG, machine shop foreman of the Texas & Pacific, has been promoted to the position of erecting shop foreman, with headquarters at Fort Worth, Tex.

J. J. PRENDERGAST, erecting shop foreman of the Texas & Pacific at Fort Worth, Tex., has been promoted to the position of general foreman, locomotive department, with headquarters in the same city.

Purchases and Stores

G. A. MCTYRE, storekeeper of the Chesapeake & Ohio at Fulton, Va., has been transferred to Covington, Ky., succeeding W. H. Stowasser.

E. T. CAMPBELL, storekeeper of the Chesapeake & Ohio at Russell, Ky., has been appointed division storekeeper, with headquarters at Richmond, Va.

M. T. MURPHY has been appointed storekeeper of the New Mexico division north of Raton, N. M., of the Atchison, Topeka & Santa Fe, with headquarters at Raton.

J. G. HILGEN, storekeeper of the Chesapeake & Ohio, at Richmond, Va., has been appointed division storekeeper, with headquarters at Russell, Ky.

L. H. STREETER has been appointed storekeeper of the Plains division of the Atchison, Topeka & Santa Fe, with headquarters at Waynoka, Okla., succeeding A. B. Sears.

A Wabash Train at Brunswick, Mo.

A. B. SEARS, storekeeper of the Plains division of the Atchison, Topeka & Santa Fe at Waynoka, Okla., has been transferred to the Ottawa car works at Ottawa, Kan.

A. SINGLETON, purchasing agent of the Hocking Valley at Columbus, Ohio, has been appointed assistant purchasing agent of the Chesapeake & Ohio Lines, with headquarters at Richmond, Va.

L. R. HERRING has been appointed storekeeper of the Western division of the Atchison, Topeka & Santa Fe, with headquarters at Dodge City, Kan., replacing A. J. Baker.

J. C. MCCAUGHAN, general storekeeper of the Hocking Valley, has been appointed assistant general storekeeper of the Chesapeake & Ohio, with headquarters as before at Columbus, Ohio.

Obituary

P. T. DUNN, former master mechanic on the Pennsylvania at Chicago, Richmond, Ind., Wellsville, Ohio, and Cincinnati, and for the past few years connected with the office of the superintendent of motive power at Cleveland, Ohio, died in the latter city on March 24.

Miguel Castillo

MIGUEL CASTILLO, assistant to the superintendent of machinery and motive power of the National Railways of Mexico, who died on March 15, was born in Mexico City on September 25, 1878. He received his education in private schools and on May 17, 1894, began his railroad career as a machinist apprentice in the Santiago (now Nonoalco) shops of the National Railways of Mexico. At the termination of his apprenticeship he served first as a machinist and later as a foreman, on May 1, 1910, being promoted to the position of master mechanic at Acambaro. He was transferred to a similar position at Nonoalco (Mexico City) on September 1, 1912, and on December, 14, 1914, was appointed assistant superintendent of motive power and machinery, with headquarters at Mexico City. He was later transferred to Monterrey, N. L.

Trade Publications

Copies of trade publications described in the column can be obtained by writing to the manufacturers. State the name and number of the bulletin or catalog desired, when mentioned in the description.

SMALL TOOLS.—The Morse Twist Drill & Machine Company, New Bedford, Mass., in a pocket edition of its catalogue describes and illustrates high speed and carbon drills, reamers, cutters, taps, dies, etc. Prices are also given.

STEAM DROP HAMMERS.—Instructions for the erection and maintenance of Type G Erie steam drop hammers, as well as a detailed description of their construction, are given in Bulletin No. 230, a 24-page illustrated booklet prepared by the Erie Foundry Company, Erie Pa.

HYDRO-POWER PRESS.—The new H-P-M hydro-power press adapted for heavy pressing operations, such as blanking, coining, drawing, punching, stamping, straightening, etc., is described and illustrated in the 16-page illustrated booklet issued by the Hydraulic Press Manufacturing Company, Columbus, Ohio.

CHEVENARD EQUIPMENT. — Chevenard equipment for thermal studies of steels, alloys, and various products, such as refractories, bricks, lignites, etc., is illustrated and described in Catalogue D-1 issued by the R. Y. Ferner Company, Investment building, Washington, D. C. The equipment includes industrial thermal analysers and differential dilatometers.

COFFIN FEEDWATER HEATER SYSTEM.—A revised edition of the book of instructions for operating the Coffin feedwater heater system has been issued by the J. S. Coffin, Jr., Company, Englewood, N. J. The information has been so arranged as to make it easy to find information on any part of the Coffin feedwater heater system. Part I contains a general description of the system; Part II, information on the care of the equipment, and Part III operating questions and answers. Diagrammatic drawings clearly show the various parts of the system.

NOTES ON USES OF NICKEL CAST IRON.—Outstanding applications of nickel cast iron, classified under five industrial fields—automotive, aeronautical, general machinery, machine tool and power—are discussed in the publication entitled "Notes on Uses of Nickel Cast Iron" which has been issued by the International Nickel Company, Inc., 67 Wall street, New York. This publication is presented in handbook form, but the information contained therein is practically identical with that contained in a publication of the same title recently distributed to foundry officers in this country and Canada. A thumb index provides a ready reference to each of the fields covered and also to a section discussing the properties and applications of nickel cast iron.